SUPERSCOPE
BY marantz

PORTABLE
CASSETTE
RECORDER

Model C-190

SERVICE DATA

Oct. 1977

SUPERSCOPE INC.
20525 NORDHOFF STREET
CHATSWORTH, CALIFORNIA • 91311 • U.S.A.

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SPECIFICATIONS

DIMENSIONS . . . . . W:182mm x H:71mm x D:249mm
(7-1/4" x 2-3/4" x 9-3/4")
WEIGHT . . . . . 2.1 kg (4 lbs 10oz) with Batteries
POWER REQUIREMENTS . . . . . EXT. DC 6V
Four "C" Size Flashlight Batteries
220V AC5W 50/60 Hz (for Europe)
120V AC5W 60 Hz (for U.S.A. and Canada)
NUMBER OF SEMICONDUCTORS
Transistor 7
FET 1
Varistor 2
Diode . . . . . 3 (for U.S.A. and Canada), 5 (for Europe)
TERMINALS
One Microphone Input . . . . . Plug Type: Mini
Input Sensitivity: 0.45 mV (—67 dBV)
Impedance : 10 ± 3 kΩ
One Line Input (AUX) . . . . . Plug Type: Mini
Input Sensitivity: 100 mV (—20 dBV)
Impedance: 100 ± 7 kΩ
One DIN (Rec/Play) . . . . . for European Model Only
Plug Type: DIN
Input Sensitivity: 50 mV (—26 dBV)
Input Impedance: 47 ± 5 kΩ
Output Impedance: 3.9 kΩ
One EXT. Speaker . . . . . Plug Type: Mini
Power Output: 0.6W
One Stereo Headphone . . . . . Plug Type: Phone
Impedance: 8Ω
One AC Inlet
One DC Input
TYPE OF LEVEL INDICATION . . . . . 1 VU Meter
TAPE RECORDING SECTION
Tape . . . . . PHILIPS Compact Tape
Recording System . . . . . Half Track AC Bias
Erasing System . . . . . Half Track DC Erase
Rewind and Fast Forward Time 115 sec/C-60
Number and Type of Motor . . . . . One DC Electrical

1. FEATURES

1.1 ONE-TOUCH RECORDING

The tape recorder can be set to the recording mode just by pressing the REC button. There is no need to press the PLAY button.

1.2 TOTAL SHUT-OFF

The tape recorder's mechanisms are released automatically and the machine set to the STOP mode when the tape is fully wound, irrespective of whether the machine is set to the REC, PLAY, FF or REW mode.

1.3 HEADPHONE JACK

This jack can be used for either monaural or stereo headphones.

1.4 RECORDING SELECTOR

If you set this selector to ARL when the tape recorder is set to the recording mode, the recording level will be automatically adjusted. If you set the selector to LIMITER, you can adjust the recording level with the REC LEVEL controls. Also, when the input exceeds the maximum level, the limiter circuit is actuated and the input level is held down to its proper level. When the selector is set to MANUAL, the limiter circuit ceases to operate and you can then adjust the input level with the REC LEVEL controls so that it does not exceed its proper level.

1.5 CUE AND REVIEW

When the tape recorder is set to the playback mode, you can perform cue and review as you listen to the sounds on the tape if you press the FF or REW operating buttons.

1.6 TONE CONTROL

1.7 TAPE COUNTER

1.8 3-WAY POWER SUPPLY

Three forms of power can be supplied to operate this tape recorder. In order of priority, they are AC → EXT DC → batteries.

1.9 TAPE SPEED CONTROL

When the tape recorder is set to the playback mode, the tape speed can be increased or decreased by a maximum of 20 per cent. However, when the tape recorder is set to the recording mode, the tape speed cannot be varied even if this control is rotated.

1.10 LEVEL METER

This meter indicates the strength of the recording level when the tape recorder is set to the recording mode. It also indicates the power voltage when the tape recorder is set to the playback mode. (The 0VU position indicates 4.5V).

2. SERVICE NOTE

As can be seen from the circuit diagram, the chassis of Model C-190 consists of following units. Each unit mounted on a printed circuit board is described within the square enclosed by a bold dotted line on the circuit diagram.

Amp. . . . . mounted on P.W. Board, P101
Power Supply . . . . . mounted on P.W. Board, P201

3. TEST EQUIPMENT REQUIRED FOR SERVICING REPLACEMENT

For measuring or checking the Model C-190, the following instruments and materials are necessary.

(1) Audio Oscillator (af OSC)
(2) Attenuator (600Ω)
(3) VTVM
(4) Distortion Meter
(5) Oscilloscope
(6) Bandpass Filter
(7) Wow and Flutter Meter
(8) Digital Frequency Counter
(9) Torque Meter
(10) Test Tape (New Tape)
- MTT-111: Wow and Flutter, Tape Speed
- MTT-112: Measurement of Output Level, Signal-to-Noise Ratio
- MTT-116R: Measurement of Frequency Response
- MTT-121: Cross Talk

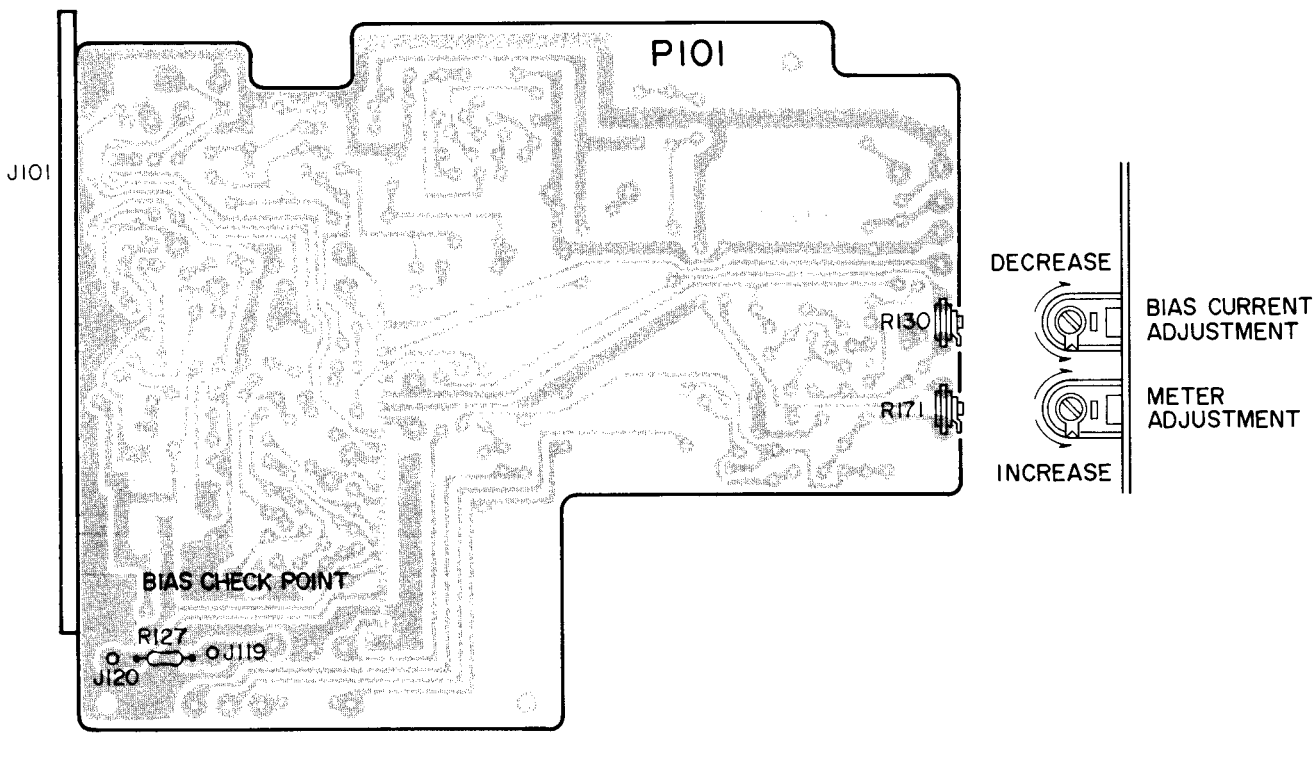
(11) Blank Tape (Completely erased with bulk eraser)
(12) Power Supply

NOTE: If any doubt is noted in a measured value, use new tape.

4. ADJUSTMENT INSTRUCTIONS

NOTE: Before making any adjustments or measurements described below, clean the heads with gauze containing alcohol or carbon tetrachloride, and fully demagnetize the heads, capstan and similar parts. After adjustment, apply a drop of paint to the adjustment screw heads and chassis to maintain the proper adjustment.

4.1 ADJUSTING POINTS



4.2 RECORD BIAS ADJUSTMENT

With the tape recorder set on record mode, adjust R130 until the voltage across R127 reads approximately 70mV (700 μA).

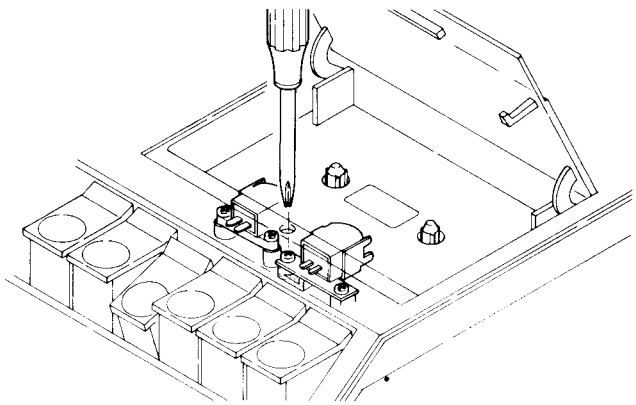
Use a low capacitance probe and a calibrated scope of VTVM for this measurement. Counterclockwise rotation of bias controls will increase the current.

After adjusting the bias current, check the recording and playback frequency response. Apply a 1kHz, 0.03mV (-90dB) input signal to the MIC jack, and in this state record the signal on a blank tape, then, record a 4kHz signal.

Rewind the tape, play it back, and set the variable resistor for a 1kHz playback output of 63mVrms. Use this voltage as the reference and re-adjust the bias current for a 4kHz signal of around -2dB with respect to the 1kHz input signal. (Set the REC selector to ARL).

4.3 AZIMUTH ADJUSTMENT

Playback a standard alignment tape with a 6.3 kHz frequency. Adjust the azimuth adjusting screw (884N) for maximum output. Verify this with an AC VTVM connected to EXT SP jack. After adjustment, start and stop the tape several times to ensure no azimuth deviation exists.

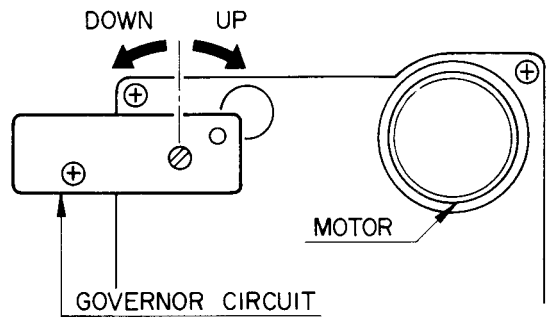


4.4 LEVEL METER ADJUSTMENT

Set the tape recorder to the playback mode and adjust R151 so that the meter pointer deflects to 0VU when the power voltage is set to 4.5V.

4.5 TAPE SPEED CONTROL

Set the power voltage to 6V and align the VARI-SPEED knob with the 0 position. Play back the MTT-111 test tape and adjust the trimming resistors on the servo circuit pwb until the frequency is 3,000 Hz.

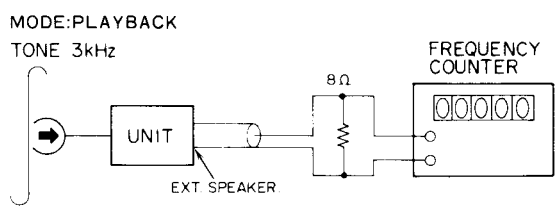


5. MEASUREMENT INSTRUCTIONS (Set the TONE controls to the +5 position)

5.1 TAPE SPEED MEASUREMENT

SET UP

(1) Power voltage: DC 6V
(2) Output terminal: EXT. SP
(3) Test tape used: MTT-111
(4) Set position: Horizontal



PROCEDURES

(1) Play the mid portion of the test tape MTT-111 back and read out the indication on the frequency counter.
[Limit] 3,000Hz ±3%

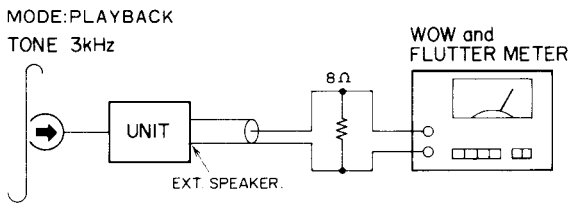
5.2 WOW AND FLUTTER MEASUREMENT

SET UP

(1) Power voltage: DC 6V
(2) Output terminal: EXT. SP
(3) Test tape used: MTT-111
(4) Set position: Horizontal
(5) Wow and flutter meter function switch:
U.S.A. and Canada version: NAB WTD
Europe version: DIN WTD

PROCEDURES

(1) Measure the wow and flutter right from the start of the test tape MTT-111 playback to the end, and read out the indications on the wow and flutter meter.
[Limit] NAB WTD: 0.27%
DIN WTD: 0.45%



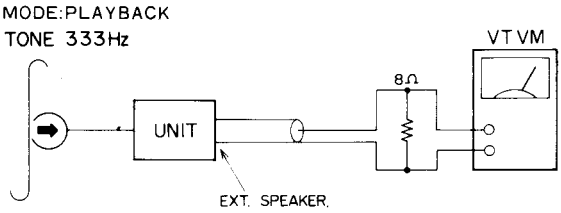
5.3 PLAYBACK SIGNAL-TO-NOISE RATIO MEASUREMENT

SET UP

(1) Power voltage: DC 6V or AC (rating)
(2) Output terminal: EXT. SP
(3) Test tape used: MTT-112
(4) Load: 8Ω

PROCEDURES

(1) Play back the test tape MTT-112 and adjust the variable resistor so that the output voltage with an 8Ω resistance becomes 0.63Vrms (50mW), and let this voltage be 0dB. (This is hereafter referred to as the 'normal playback state').
(2) Press the PAUSE button and stop the tape. Read out the ratio in decibels with the level of noise generated at both ends.
[Limit] 50dB (DC), 45dB (AC)



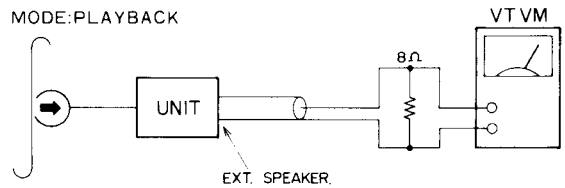
5.4 PLAYBACK FREQUENCY RESPONSE MEASUREMENT

SET UP

(1) Power voltage: DC 6V
(2) Output terminal: EXT. SP
(3) Test tape used: MTT-116R
(4) Load: 8Ω

PROCEDURES

(1) Play back the test tape MTT-116R and let the 315Hz signal recorded at 0dB be the normal playback state.
(2) Let the 315Hz signal level recorded at −10dB be 0dB as the reference level, and read the difference in the reference and each frequency level.
[Limit] 125Hz: +2 ~ −10dB
6.3kHz: +2 ~ −10dB



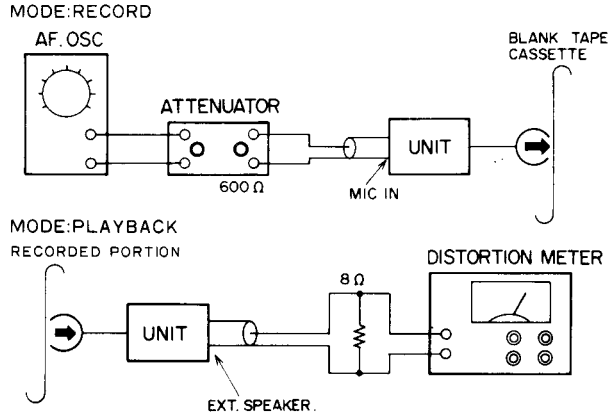
5.5 RECORD-PLAYBACK HARMONIC DISTORTION MEASUREMENT

SET UP

(1) Power voltage: DC 6V
(2) Input: 1kHz, −60dB signal (MIC jack)
(3) Output terminal: EXT. SP
(4) Load: no load when recording;
8Ω load with playback
(5) Cassette tape used: TDK DC-60
(6) REC selector switch position: ARL

PROCEDURES

(1) Apply a 1kHz, −60dBV signal to the MIC jack and record. (This is hereafter referred to as the 'normal recording state').
(2) Play back with the tape recorder set to the normal playback state and measure the distortion.
[Limit] 7%



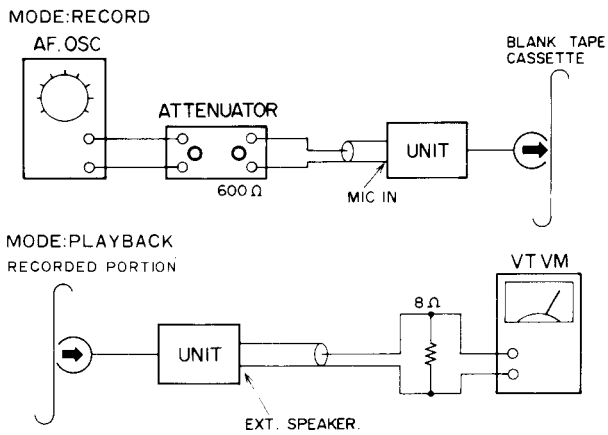
5.6 RECORD-PLAYBACK SIGNAL-TO-NOISE RATIO MEASUREMENT

SET UP

(1) Power voltage: DC 6V or AC (rating)
(2) Input: 1kHz, -60dBV signal (MIC jack)
(3) Output terminal: EXT. SP
(4) Load: no load when recording;
8Ω load with playback
(5) Cassette tape used: TDK DC-60
(6) REC selector switch position: ARL

PROCEDURES

(1) Record with the tape recorder set to the normal recording state. Insert the erase plug into the AUX jack and disconnect the MIC jack plug. In this state, record the signal on a blank tape.
(2) Play the 1kHz signal back in the normal playback state. Let the output level be 0dB, and read the difference between the recorded 0dB reference output and the no-signal output level.
[Limit] 40dB (DC), 38dB (AC)



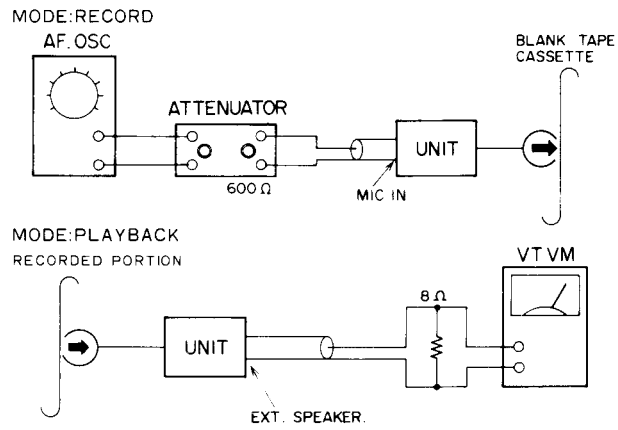
5.7 RECORD-PLAYBACK FREQUENCY RESPONSE MEASUREMENT

SET UP

(1) Power voltage: DC 6V
(2) Input: 1kHz, -90dBV signal (MIC jack)
(3) Output terminal: EXT. SP
(4) Load: no load when recording;
8Ω load with playback
(5) Cassette tape used: TDK DC-60
(6) REC selector switch position: ARL

PROCEDURES

(1) Apply a 1kHz, -90dBV signal to the MIC jack and then vary the frequency across a 250Hz ~ 4kHz range.
(2) Play back the 1kHz signal and adjust the variable resistor for a 63mV output voltage to the 8Ω load. Let 0dB be the reference level.
(3) Read out the difference in dB between the reference level and the frequency levels.
[Limit] 250Hz: +2 ~ -8dB 4kHz: +2 ~ -8dB



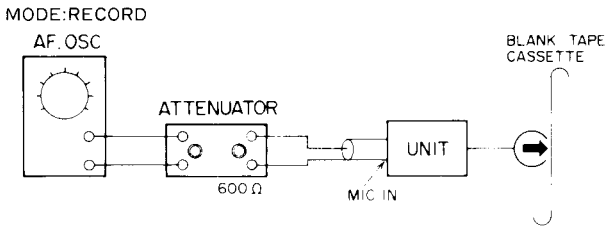
5.8 ERASING EFFECT MEASUREMENT

SET UP

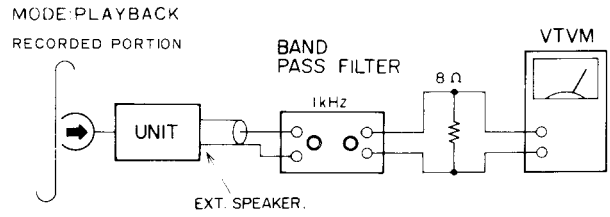
(1) Power voltage: DC 6V (4.5V when erasing)
(2) Input: 1kHz, -60dBV signal (MIC jack)
(3) Output terminal: EXT. SP
(4) Load: no load when recording;
8Ω load with playback
(5) Cassette tape used: TDK DC-60
(6) Filter used: 1kHz band-pass filter
(7) REC selector switch position: ARL

PROCEDURES

(1) Record a 1kHz -60dBV input signal with the tape recorder set to the normal recording state.



(2) Raise the MIC input to -30dBV and record.
(3) Rewind half of the portion of the tape recorded with the raised -30dB input. Disconnect the input signal from the MIC jack and connect the erase plug in its place. Then record in a no-signal state (erase) with the power voltage set to 4.5V.
(4) Return the power voltage to 6V and play back in the normal playback state the input signal recorded in the normal recording state.
(5) In turn, let the -30dBV recorded signal level be 0dB as the reference level. Read the difference of the level at the erased portion from the 0dB reference level.
[Limit] 50dB



5.9 CAUTIONS FOR VOLTAGE AND CURRENT MEASUREMENT

(1) When measuring the voltage at any point of the C-190 electrical circuits, no signal should be fed in the Tape Recorder, because the output stage comprises the Class B push-pull circuit and because the voltage under measurement varies with the input signal if applied.

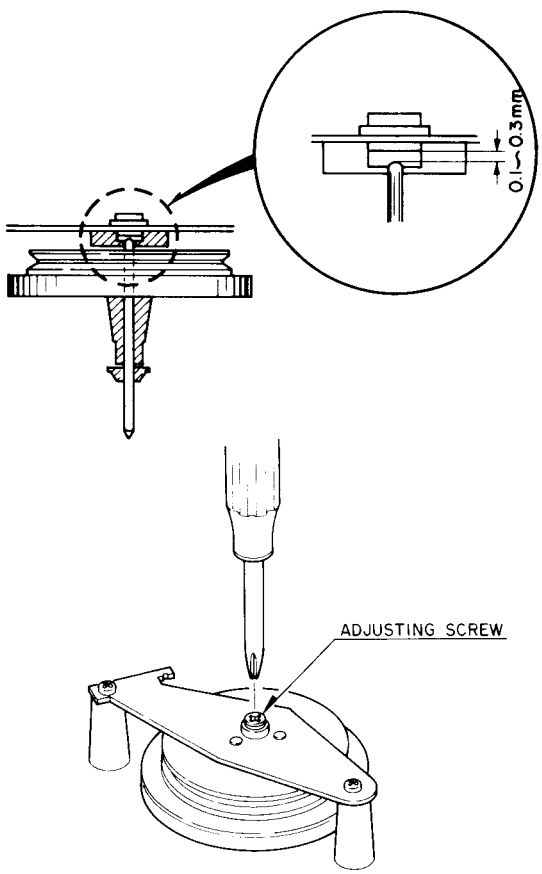
(2) The voltage values indicated on the schematic diagram for the C-190 are the ones measured with a 50 kΩ/V circuit tester set to the 6V range for higher than 1V and to 1.2V range for lower than 1V and with no input signal applied. Note that any actual voltage value, when measured, is allowed to be different by ±20% from the indicated value.

(3) Any transistor circuit is operated for a process by small voltages. Therefore, use a measuring instrument of high internal resistance and high input sensitivity for reducing the measurement error.

6. MECHANICAL ADJUSTMENT INSTRUCTIONS

6.1 FLYWHEEL THRUST

Adjust the thrust screw on the flywheel bracket using a screwdriver until the clearance between the capstan tail end and the thrust bearing becomes 0.1 mm to 0.3 mm, as indicated in the figure. The clearance itself is not visible and so it is necessary to feel the fall in the flywheel's axial direction. After adjustment, paint on the screw to lock.

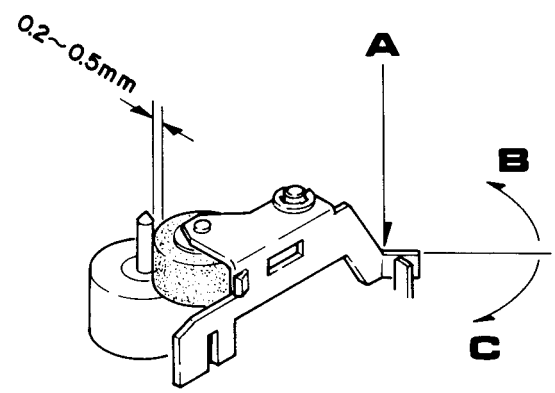


6.2 PAUSE TIMING

Depress the PLAY pushbutton down to lock. Then press down slowly on the PAUSE pushbutton, and at that instant where the take-up reel rotation is stopped, adjust the bend angle of the pinch roller bracket arm so that the clearance between the pinch roller and capstan becomes 0.2 mm to 0.5 mm. (See detail A for bend angle).

To widen the clearance between the pinch roller and the capstan, decrease the bend angle (in the direction of detail C).

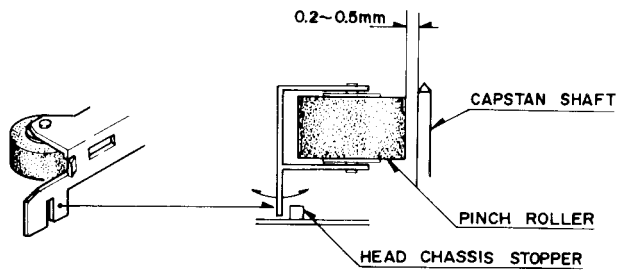
To reduce the clearance, increase this angle (in the direction of detail B).



6.3 PLAY TIMING

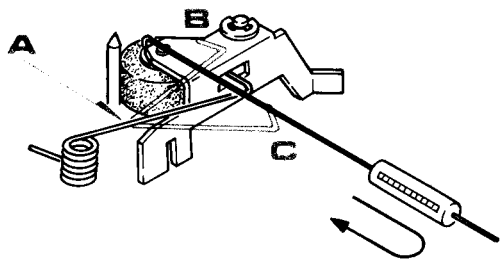
To check this operation, do not load a cassette tape and do not allow the PLAY pushbutton to be locked. In other words, perform the check with the STOP pushbutton in the depressed position.

Normal operation is indicated when the PLAY pushbutton is depressed slowly if the take-up reel table rotates and then the pinch roller rotates. A defect is indicated if both parts rotate simultaneously. When the take-up reel starts to rotate, check that the clearance between the pinch roller and the capstan is less than 0.5 mm. To adjust this clearance, bend that section of the pinch roller bracket which comes into contact with the head chassis stopper. If this section is bent in the direction of detail (A), the clearance is decreased. Conversely, bending it in the direction of detail (B) widens the clearance. Take care not to bend too much to prevent the pinch roller bracket from coming into contact with the head chassis stopper when the tape recorder is set to the play mode.



6.4 PINCH ROLLER PRESSURE

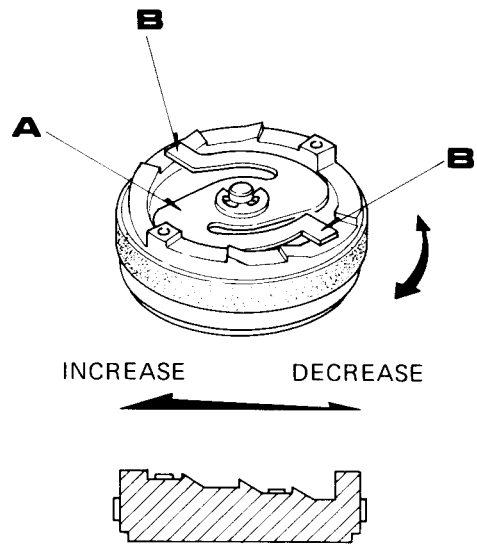
Measure the pinch roller pressure using a contact pressure gauge as indicated in the figure. Pull the pinch roller away from the capstan shaft in the direction shown by the arrow, and return it toward the capstan gradually. Read the value indicated on the gauge when the pinch roller starts to rotate. The pinch roller pressure should be 300 g ±50 g. If the value indicated by the gauge is out of this range, bend the pinch roller spring in the vicinity of detail (A) and adjust. Bending the spring in the direction of detail (B) increases the pressure, and bending it in the direction of detail (C) reduces the pressure.



6.5 TORQUE ADJUSTMENT (FF, REW)

Set the tips (detail B) of the FF/REW idler's torque adjustment leaf spring (detail A) to any of the three levels at the idler side and set.

To increase the torque, set this spring to the shallowest level, and to reduce the torque, set it to the deepest level.

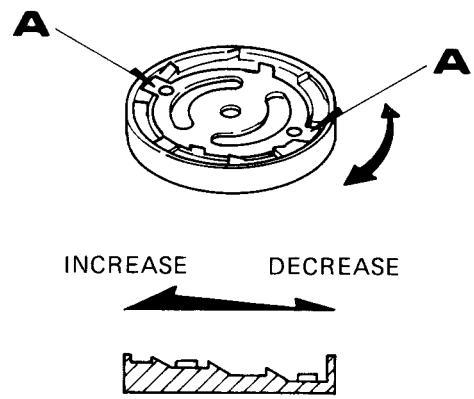


6.6 TORQUE ADJUSTMENT (PLAY)

Set the two projecting ends (detail A) of the cylindrical leaf spring onto the cradle's level section and adjust so that the torque is within a 40 g/cm to 70 g/cm range.

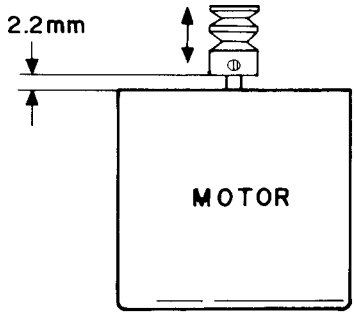
To increase the torque, set these ends onto the shallower level, and to reduce the torque, set them onto the deeper level.

Now check the sliding motion of the take-up clutch. Normal operation is indicated if the wheel rotates smoothly when the reel table is stopped. Conversely, a defect is indicated if the wheel rotates irregularly or stops and so re-adjust.

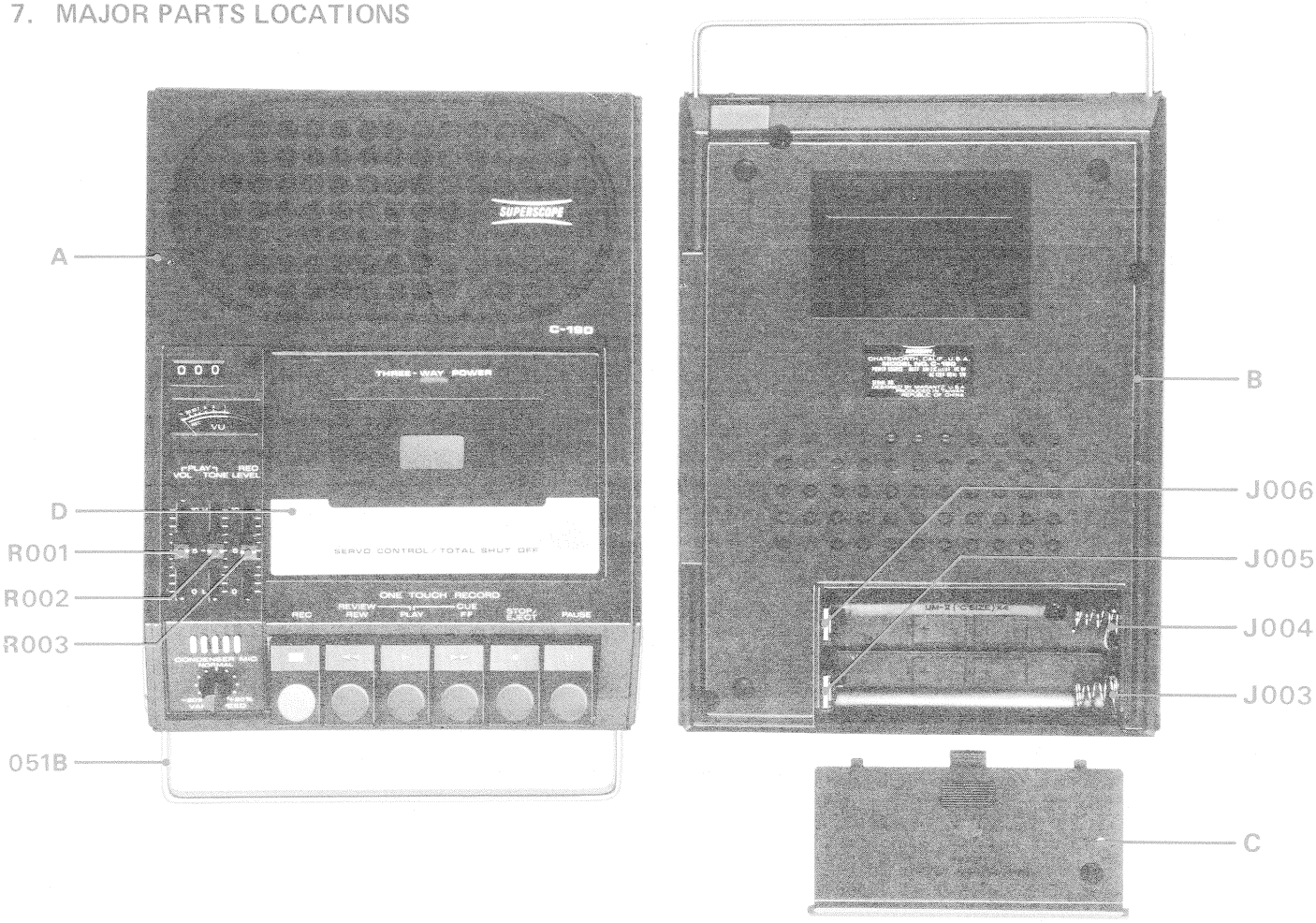


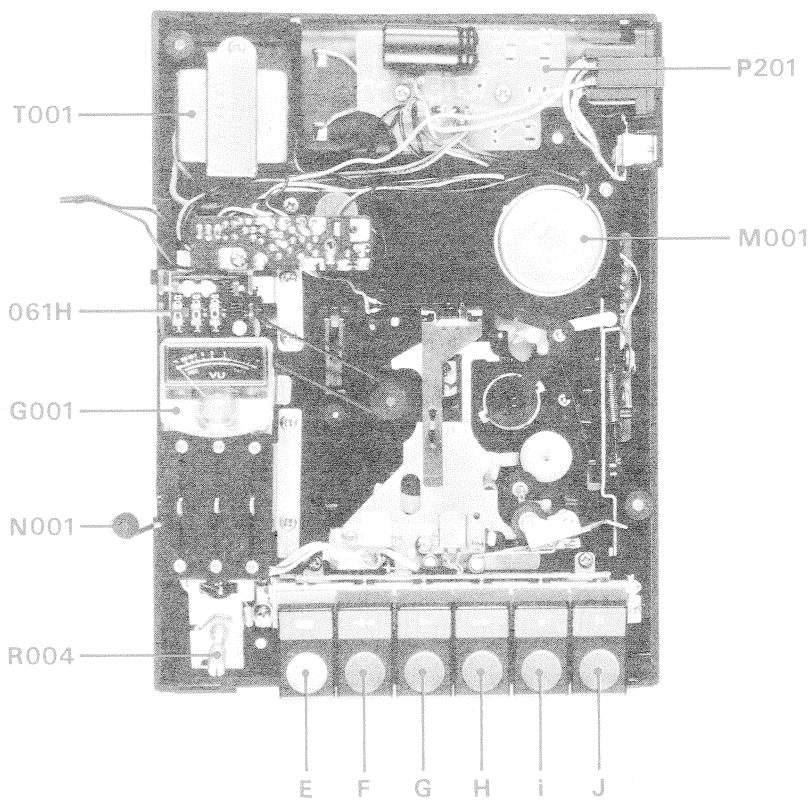
6.7 MOTOR-PULLEY CLEARANCE

Check whether the clearance between the DC motor and the pulley is 2.2 mm. If not, adjust the pulley set position.



7. MAJOR PARTS LOCATIONS

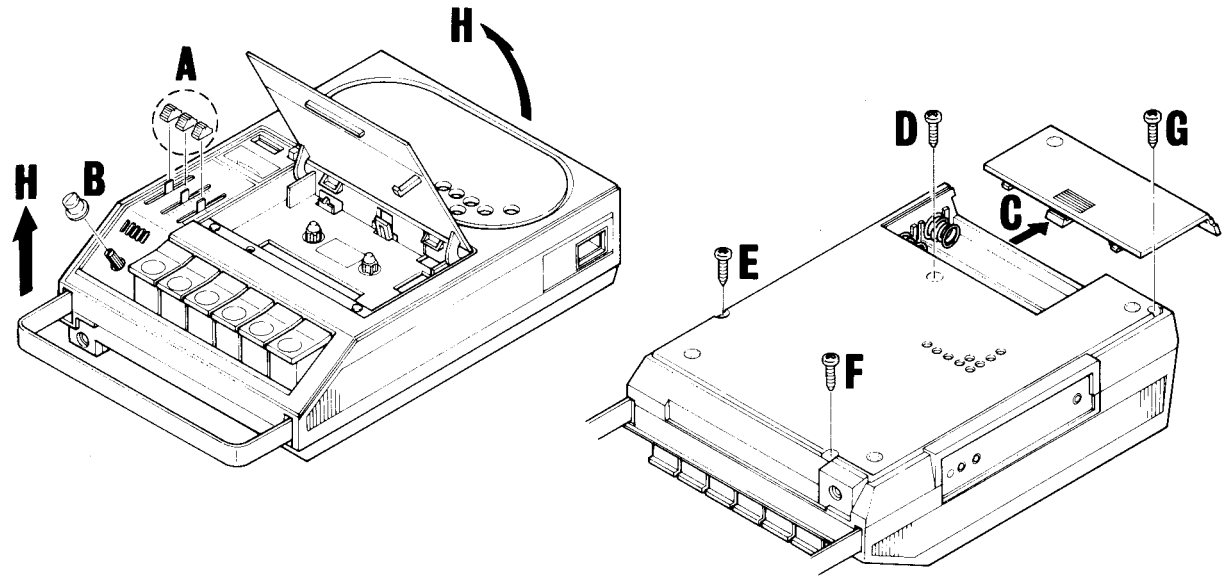




8. DISASSEMBLY PROCEDURES FOR SERVICING

8.1 REMOVING THE CASE

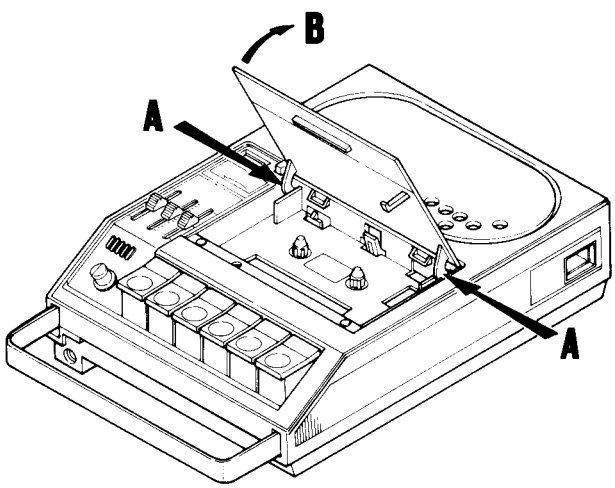
First, remove knobs(A,B) and remove the battery lid(C) in the direction indicated by the arrow. Then remove screws (D, E, F, G), and with the cassette lid open, remove the case in the direction of arrow (H).



8.2 REMOVING AND REPLACING THE CASSETTE LID

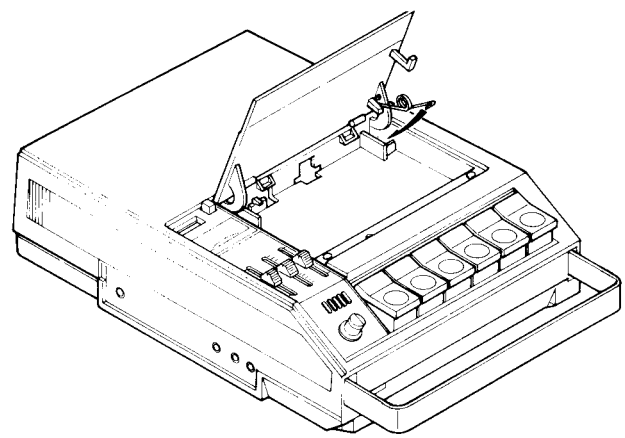
Press down firmly on the cassette lid feet in the direction of arrow (A), and centering on the fulcrum, rotate in the direction of arrow (B) and remove.

To replace, stand the cassette lid vertically on the case. Slide the fulcrum section into the groove, press down firmly on the feet in the direction of arrow (A), rotate in the opposite direction to that indicated by arrow (B), and slide into position.



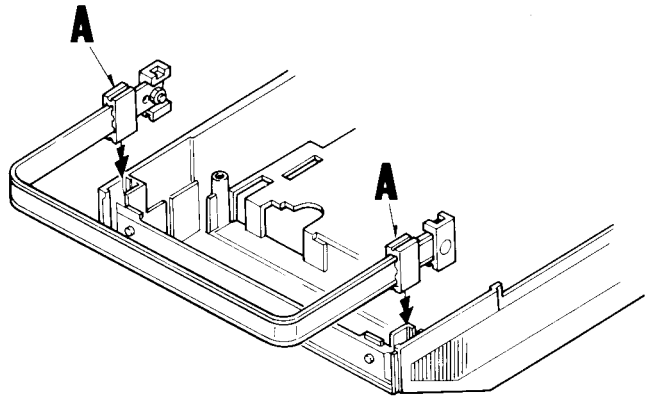
8.3 MOUNTING THE SPRING FOR CASSETTE LID 'UP'

Mount the spring into the hole of the cassette lid's right foot, rotate in the direction of the arrow and slip the spring between the boss and the cassette lid. Press down on the spring's curved section until it falls into place at the case rib.



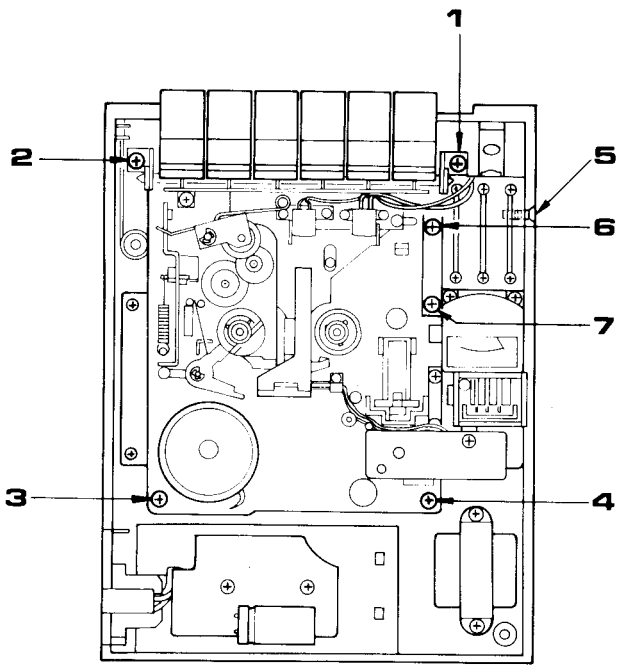
8.4 ATTACHING THE CARRYING HANDLE

Slide bushes (A) in the direction of the arrows.



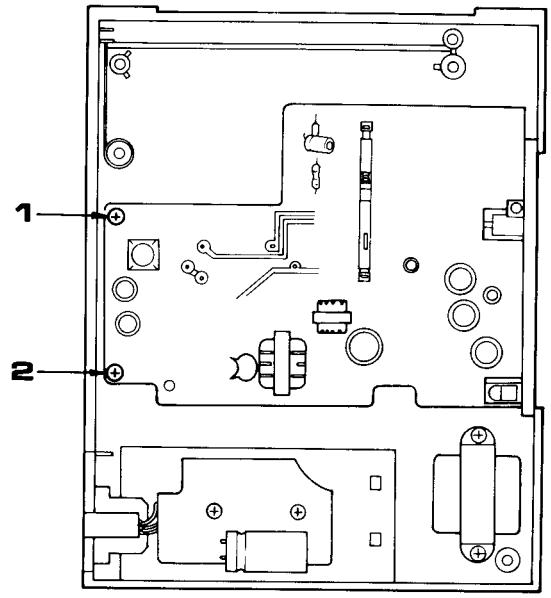
8.5 REMOVING THE TAPE MECHANISM BLOCK

First, remove screws (1, 2, 3, 4, 5) and the mechanism block can easily be taken out when screws (6, 7) are removed.



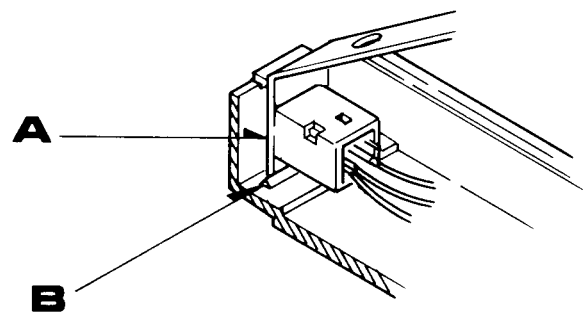
8.6 REMOVING THE MAIN P.W. BOARD

After removing the mechanism block, the main P.W. board can be removed by removing screws (1, 2).



8.7 ATTACHING THE VOLUME BRACKET

The bracket (A) should be attached over the nail (B) on the bottom lid.



9. SERVICING GUIDE

9.1 BATTERY CHECK

When loading the batteries in the C-190 battery compartment, check to insure that the power voltage is higher than 4.5V.

9.2 BATTERY POLARITY

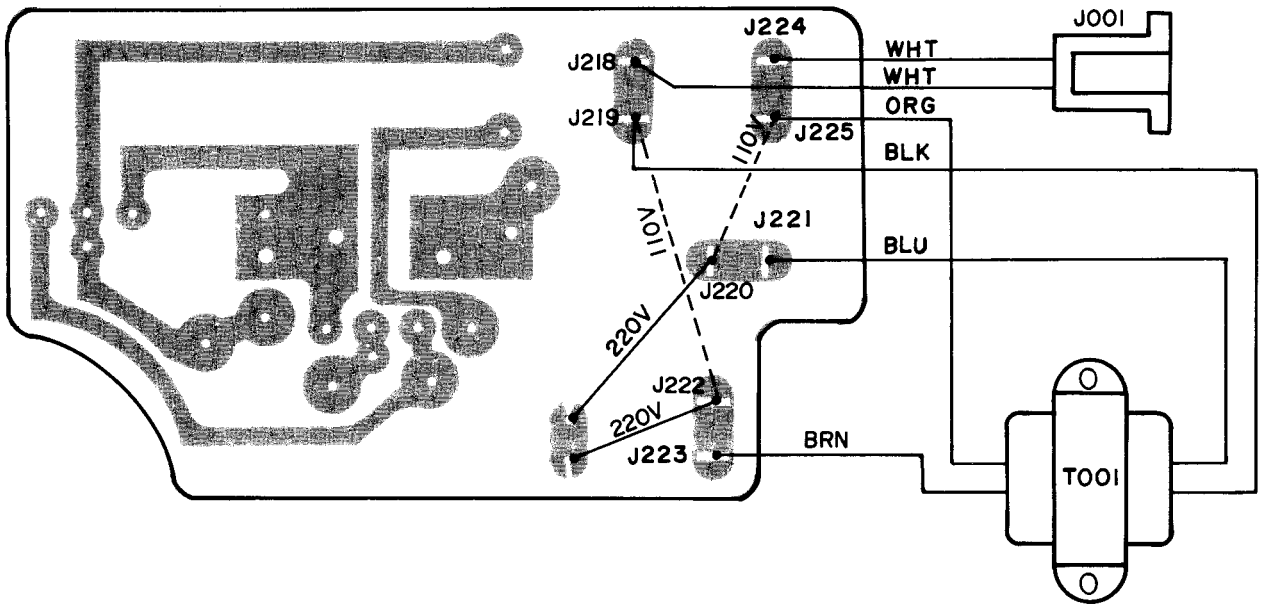
Wrong battery polarity, occurring when inserting the batteries, may damage the motor and transistors. Be careful!

9.3 HEAD CONTAMINATION

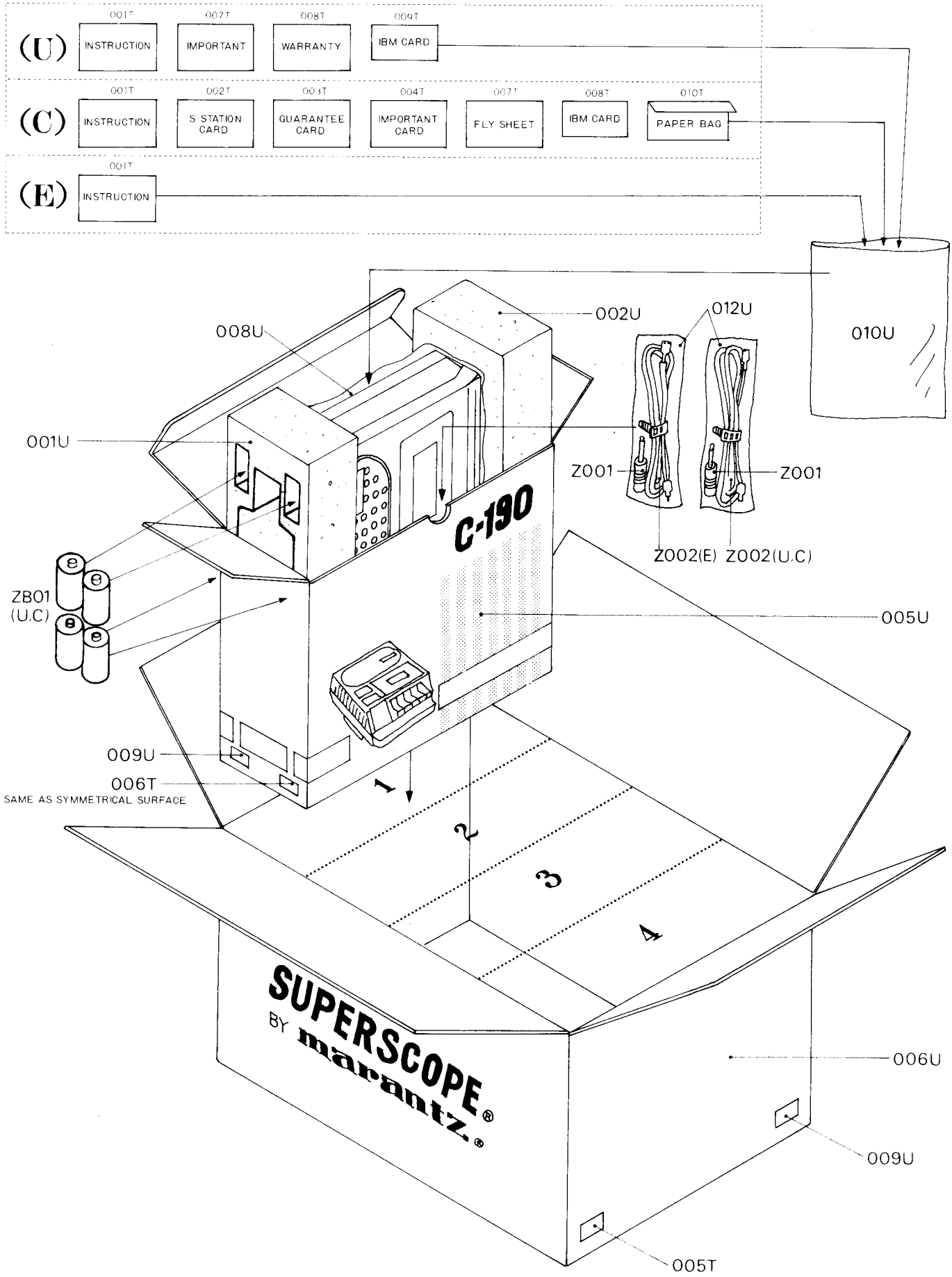
Tape tips and dust contaminating the head slits deteriorate the sound volume and tone quality. To remove the contaminating materials, wipe the head slits with soft cloth containing alcohol or carbon tetrachloride.

9.4 CHANGE OF POWER TRANSFORMER PRIMARY VOLTAGE (European Model)

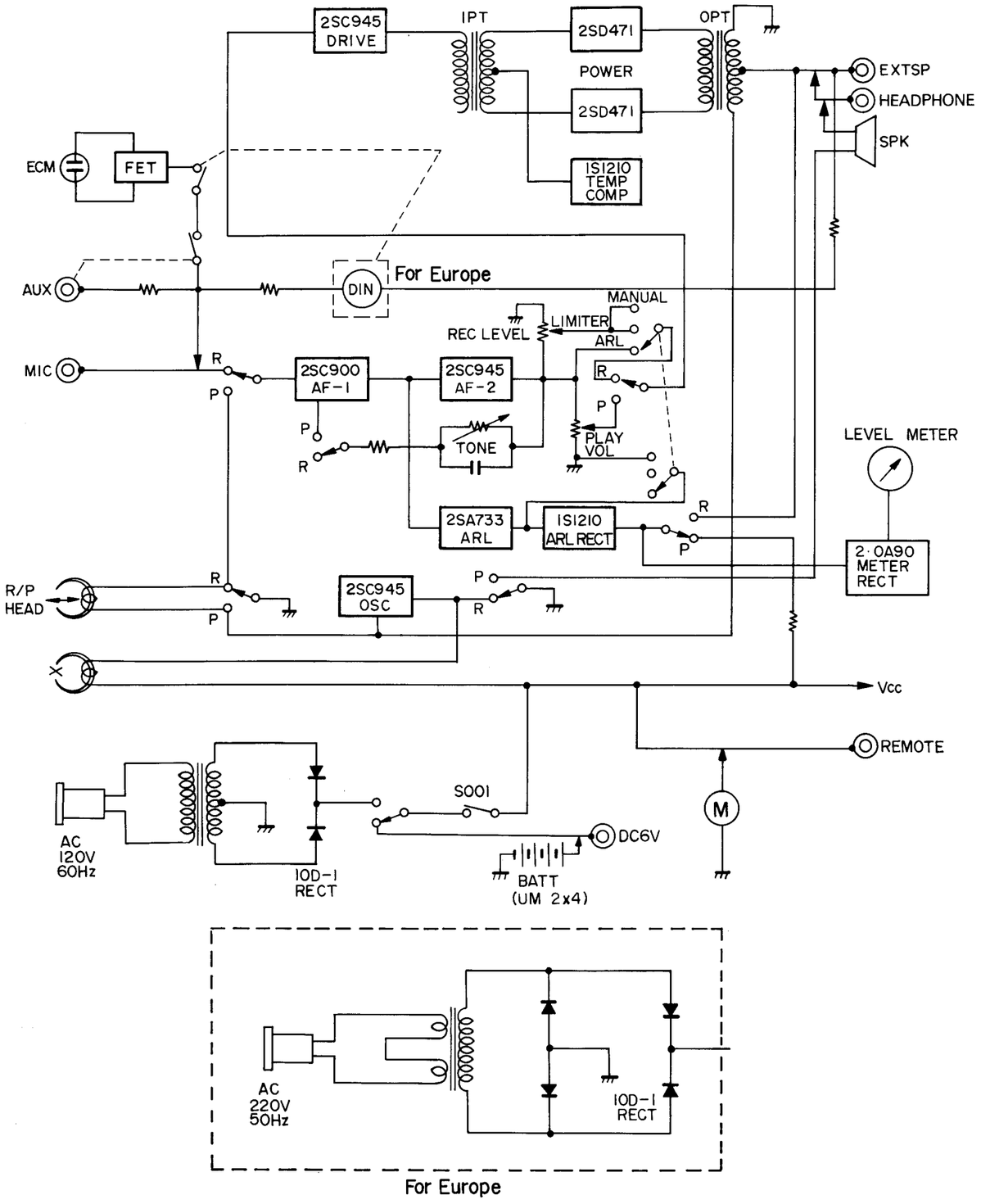
The C-190 can also be powered by a 110V AC line voltage in which case re-wire the P200 power supply pw board as per the following diagram. This model is set to operate on a 220V AC line voltage when it leaves the factory.



10. PACKING MATERIAL EXPLODED VIEWS
[H01-99] Packing Materials

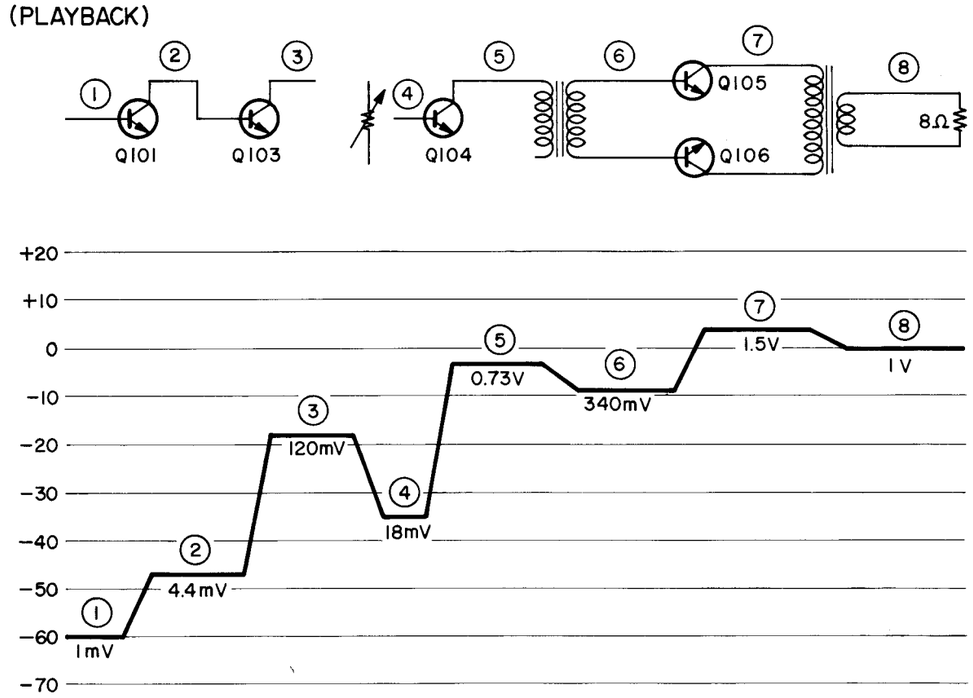


11. BLOCK DIAGRAM

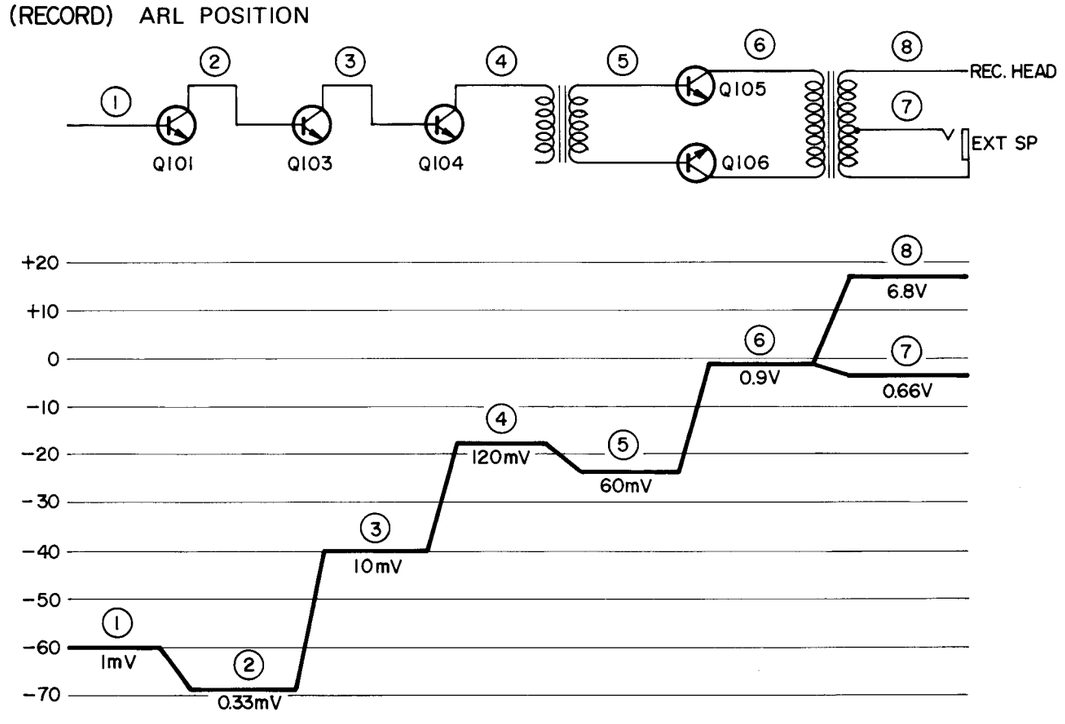


12. LEVEL DIAGRAM

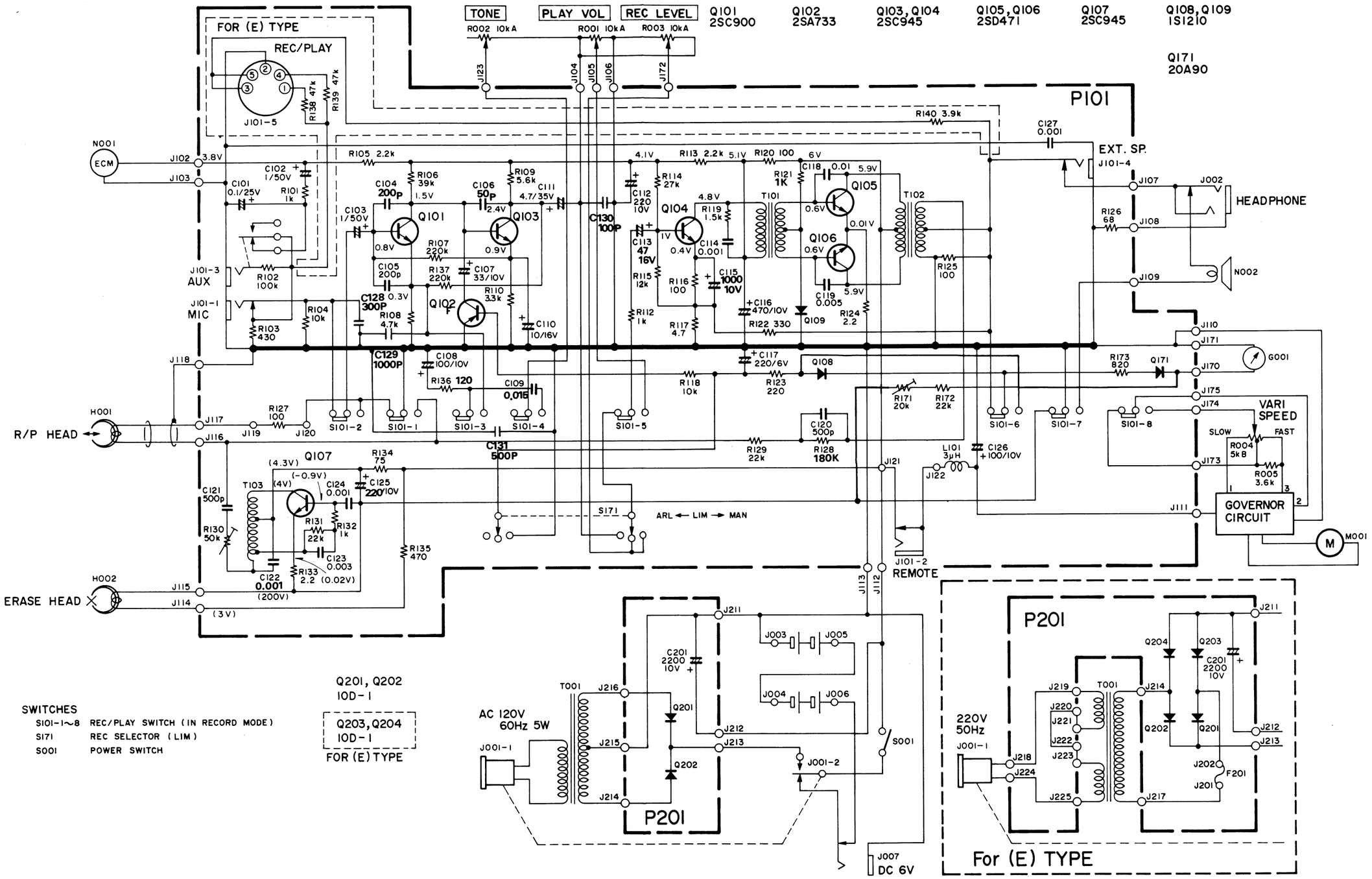
(PLAYBACK)



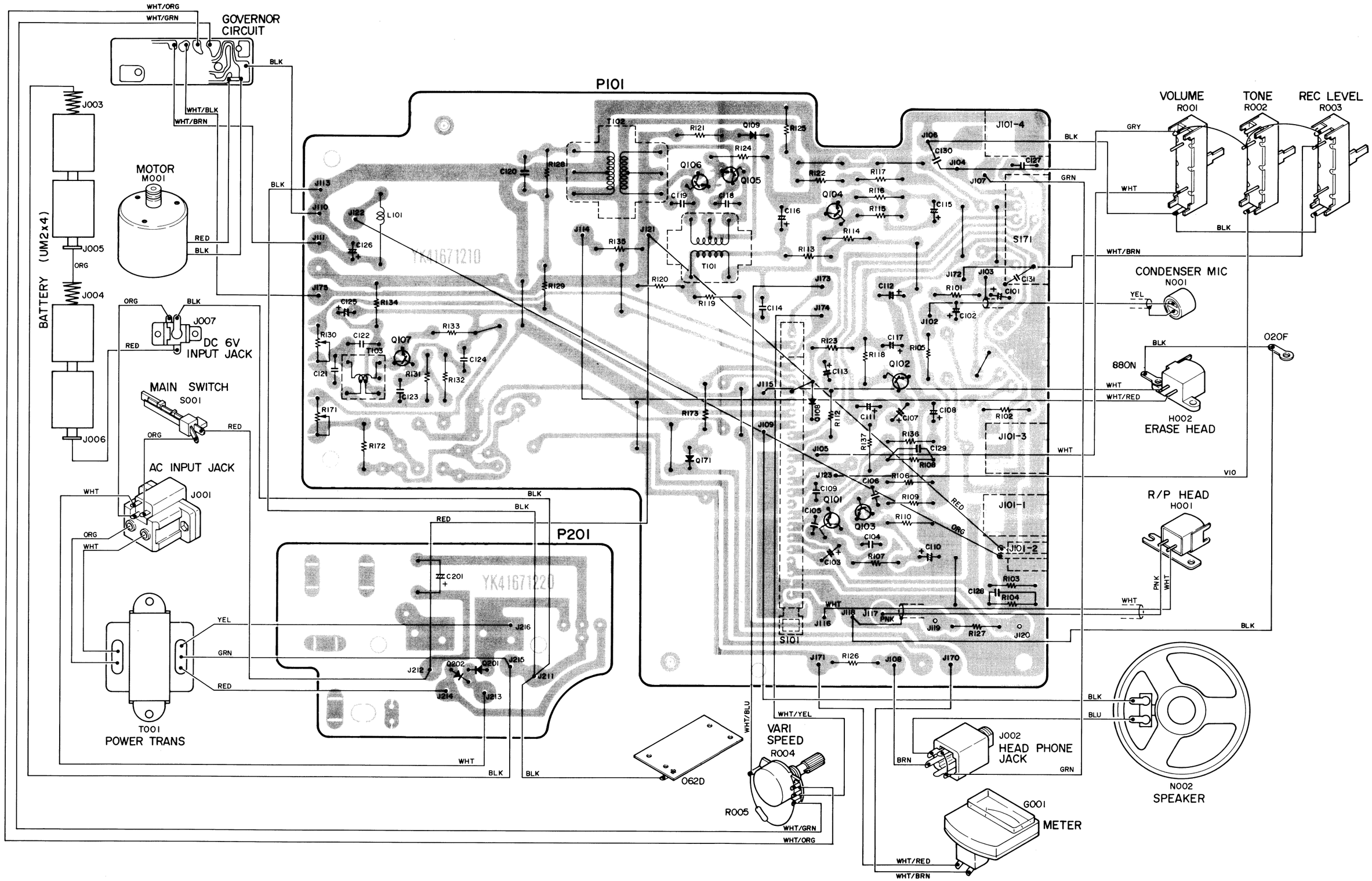
(RECORD) ARL POSITION



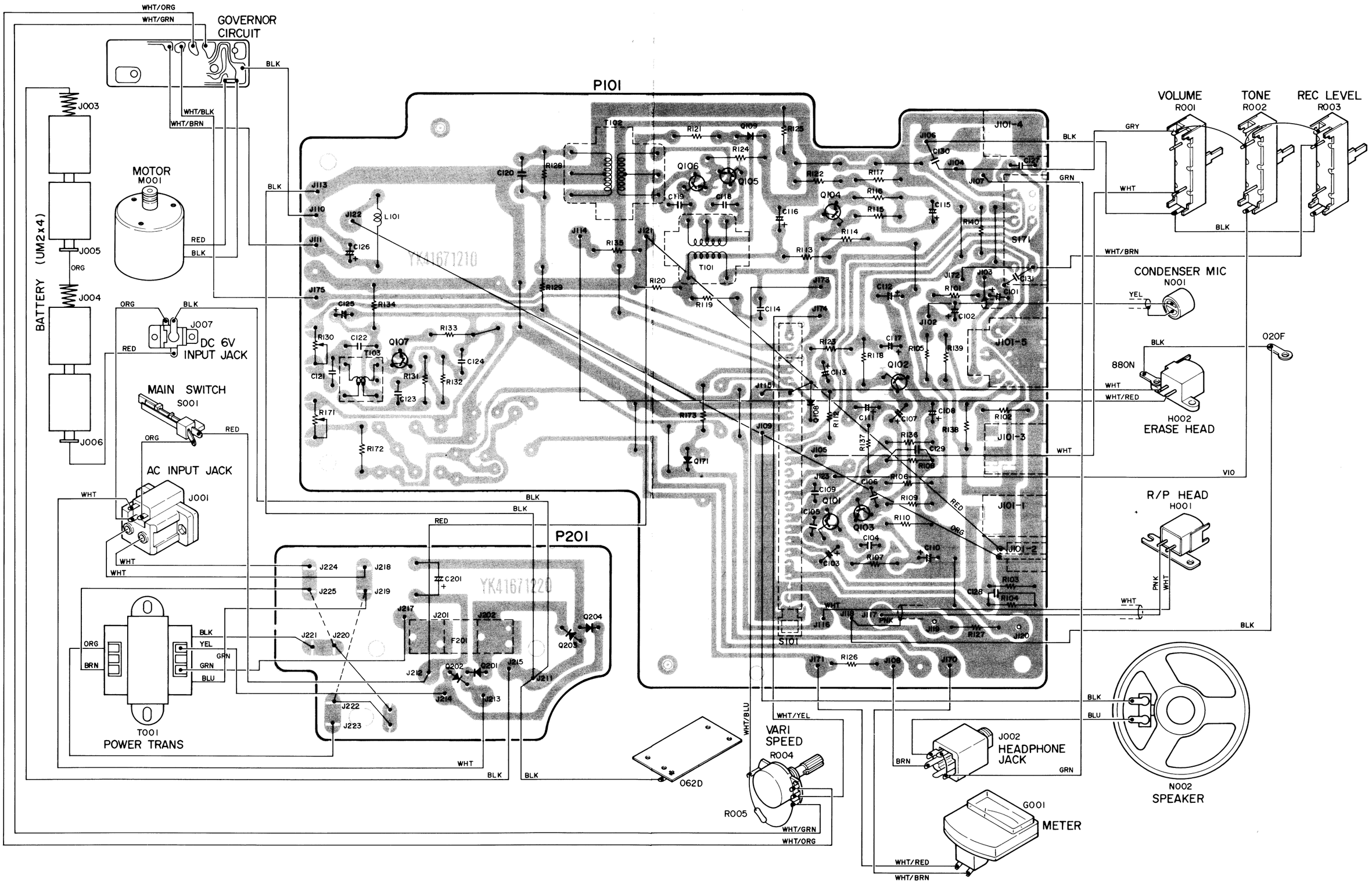
13. SCHEMATIC DIAGRAM



14. CIRCUIT BOARD DIAGRAM (for U.S.A. & Canadian Model)

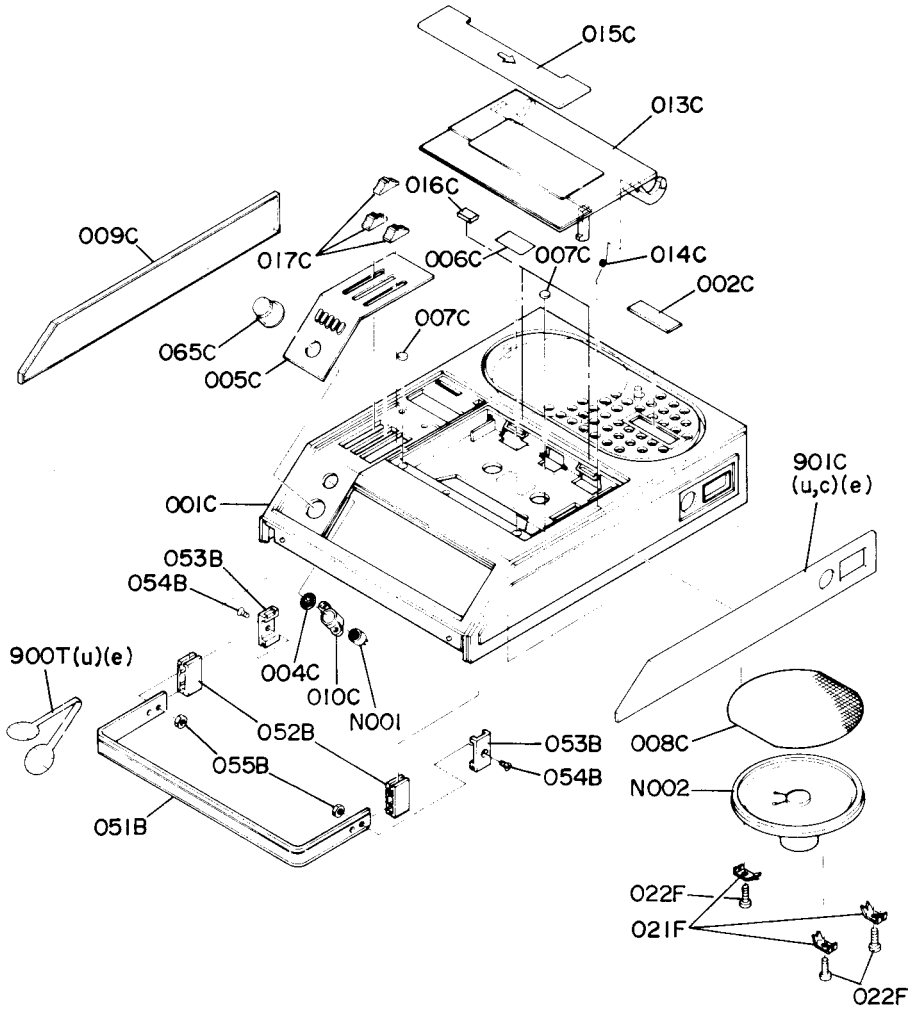


15. CIRCUIT BOARD DIAGRAM (for European Model)



16. EXPLODED VIEWS AND PARTS LIST

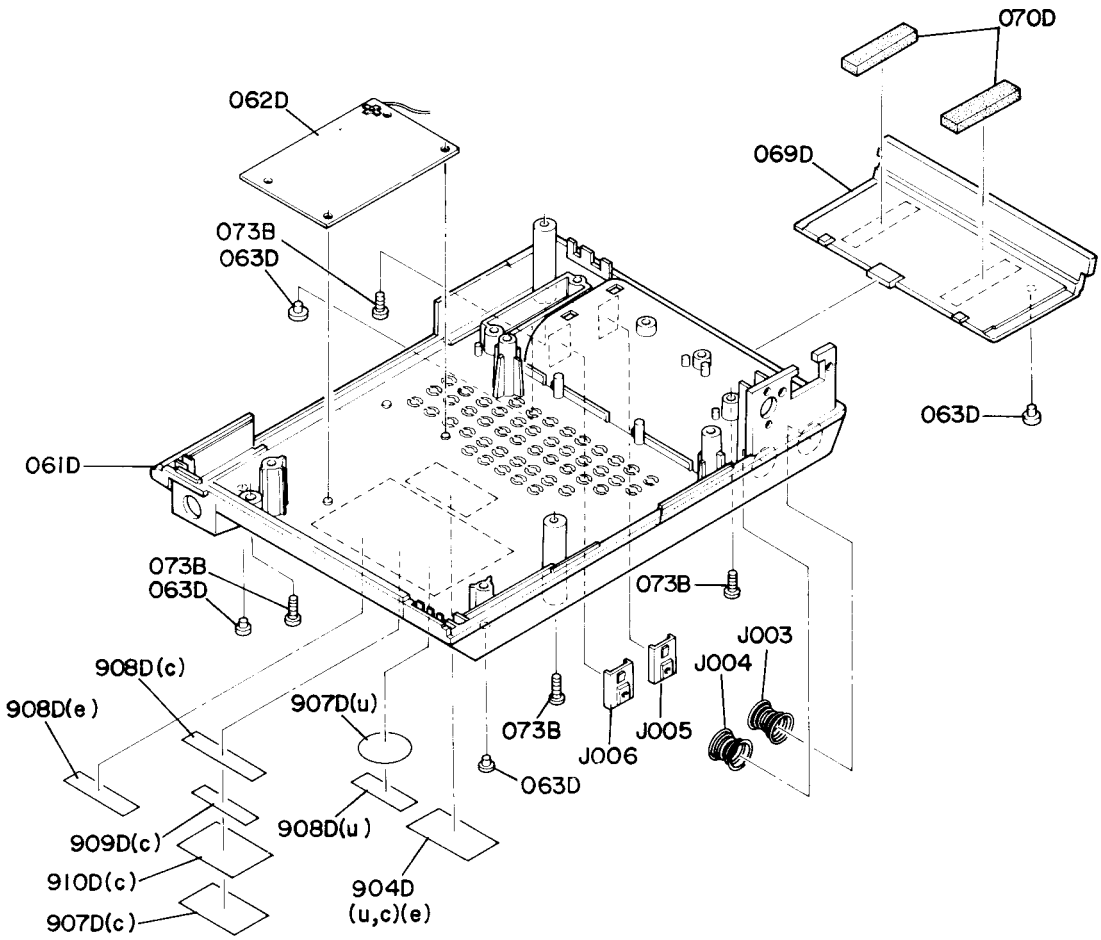
16.1 Top Case [C01-99]



REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
*	1			4169064400	Case Assembly (A, B, C)
*		1		4169064410	Case Assembly (A, B1, C)
*			1	4169064420	Case Assembly (A1, B2, C)
A	1	1		4169064430	Front Case Assembly
A1			1	4169064440	Front Case Assembly
001C	1	1	1	4169064013	Case
002C	1	1	1	4167251010	Badge
004C	1	1	1	4167107020	Sheet
005C	1	1	1	4169063010	Escutcheon
006C	1	1	1	3347274010	Reflector
007C	2	2	2	3412056062	Buffer
008C	1	1	1	4167202010	Net
009C	1	1	1	4169063020	Escutcheon
010C	1	1	1	3452271012	Holder
901C	1	1		4169063040	Escutcheon
901C			1	4169063050	Escutcheon
900T	1		1	9560000090	Hand Tag

REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
D	1	1	1	4169257430	Lid Assembly, Cassette
013C	1	1	1	4168257032	Lid
015C	1	1	1	4169063030	Escutcheon
014C	1	1	1	4167115012	Spring
016C	2	2	2	4167107030	Sheet
017C	3	3	3	4167154010	Knob
051B	1	1	1	4167253010	Handle
052B	2	2	2	4167259010	Bushing
053B	2	2	2	4167114010	Stopper
054B	2	2	2	51042608A0	F.H.M. Screw F2.6 x 8
055B	2	2	2	53112603A0	Hexagon Nut
065C	1	1	1	4169154010	Knob
021F	3	3	3	4170005010	Clamper
022F	3	3	3	51280308B0	B.H. TAP. Screw B3 x 8
N001	1	1	1	MS50000020	Mic Unit
N002	1	1	1	QK00901090	Speaker

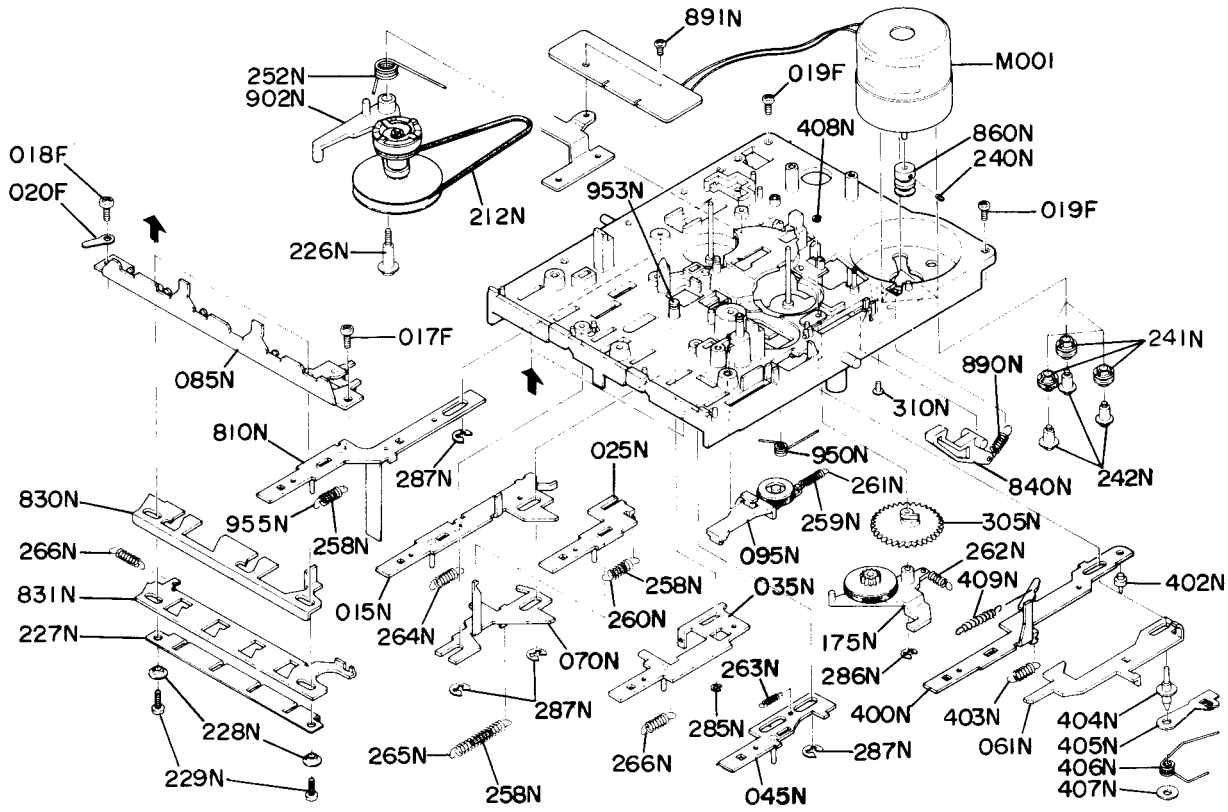
16.2 Bottom Case
[C02-99]



REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
B	1			4169257400	Lid Assembly, Bottom
B1		1		4169257410	Lid Assembly, Bottom
B2			1	4169257420	Lid Assembly, Bottom
061D	1	1	1	4167257012	Lid
062D	1	1	1	3433109013	Shield
063D	4	4	4	2858057010	Leg
904D	1			4169265010	Indicator
904D		1		4169265020	Indicator
904D			1	4169265030	Indicator
J003	1	1	1	YL11010130	Terminal (–)
J004	1	1	1	YL11010130	Terminal (–)
J005	1	1	1	YL12010010	Terminal (+)
J006	1	1	1	YL12010010	Terminal (+)

REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
C	1	1	1	4167257430	Lid Assembly, Battery
069D	1	1	1	4167257022	Lid
070D	2	2	2	3411056050	Buffer
073B	4	4	4	51280310U0	B.H. TAP. Screw B3 x 10
907D	1			9511201040	Label
907D		1		2457861040	Label
908D	1			9510911020	Label
908D		1		9510911050	Label
908D			1	9510911040	Label
909D		1		9510911010	Label
910D		1		4156861010	Label

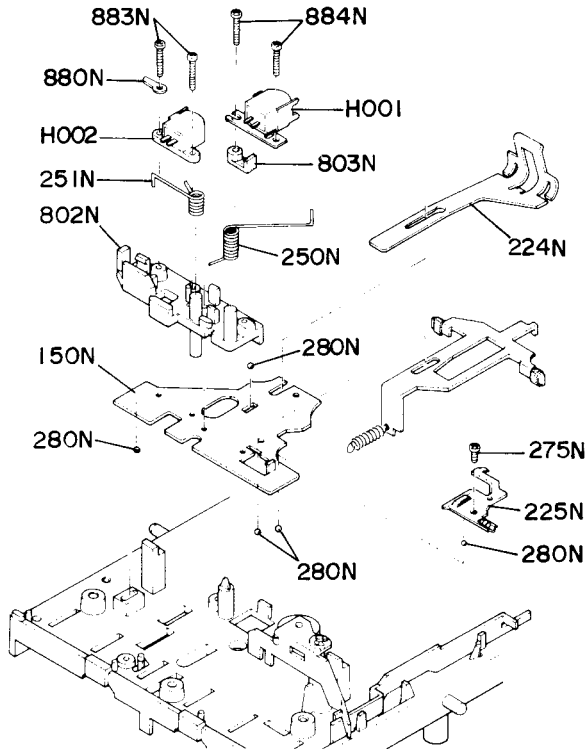
16.3 Parts Assembled on the Reverse of the Chassis [P01-99]



REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
015N	1	1	1	4367354702	Lever, REW
025N	1	1	1	4367354722	Lever, PLAY
035N	1	1	1	4367354732	Lever, FF
045N	1	1	1	4367354742	Lever, STOP
061N	1	1	1	4367354070	Lever, EJECT
070N	1	1	1	4367354062	Lever, Head Chassis
085N	1	1	1	4367051700	Guide
095N	1	1	1	4367354760	Lever, FF
175N	1	1	1	4367002722	Arm
212N	1	1	1	4367264033	Belt
226N	1	1	1	4367112180	Shaft
227N	1	1	1	4367051040	Guide
228N	2	2	2	4367055022	Collar
229N	2	2	2	51280312B0	B.H. TAP. Screw B3 x 12
240N	1	1	1	51610203A0	Set Screw, F.P.
241N	3	3	3	4367259020	Bushing
242N	3	3	3	4367112150	Shaft
252N	1	1	1	4367115080	Spring
258N	3	3	3	4367056020	Buffer
259N	1	1	1	4367056030	Buffer
260N	1	1	1	4367115240	Spring
261N	1	1	1	4367115090	Spring
262N	1	1	1	4367115120	Spring
263N	1	1	1	4367115252	Spring
264N	1	1	1	4367115263	Spring
265N	1	1	1	4367115270	Spring
266N	2	2	2	4367115280	Spring

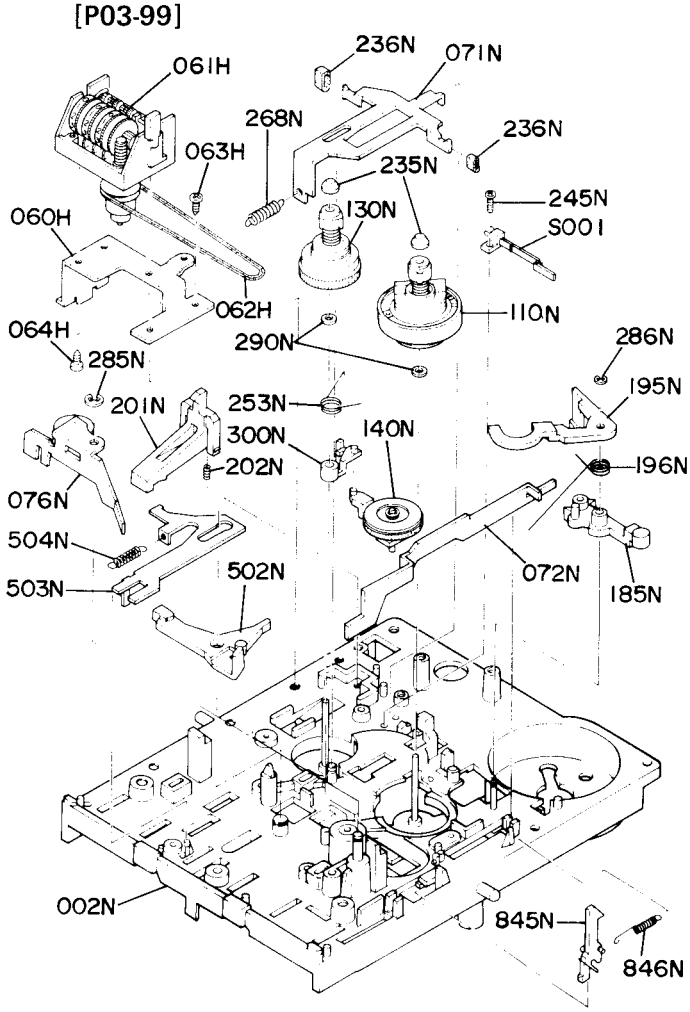
REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
285N	1	1	1	64002500R0	RG Ring, E Type
286N	1	1	1	64001500R0	RG Ring, E Type
287N	4	4	4	64000300R0	RG Ring, E Type
305N	1	1	1	4367058012	Gear
310N	1	1	1	4367254040	Pin
400N	1	1	1	4367354752	Lever
402N	1	1	1	4367254020	Pin
403N	1	1	1	4367115210	Spring
404N	1	1	1	4367112132	Shaft
405N	1	1	1	4367054030	Cam
406N	1	1	1	4367115140	Spring
407N	1	1	1	59020805G9	Washer
408N	1	1	1	64001500R0	RG Ring, E Type
409N	1	1	1	4367115150	Spring
810N	1	1	1	4378354702	Lever
830N	1	1	1	4367054010	Cam
831N	1	1	1	4367054020	Cam
840N	1	1	1	4367002040	Arm
860N	1	1	1	4378262010	Pulley
890N	1	1	1	4367115290	Spring
891N	1	1	1	51100306A9	B.H.M. Screw B3 x 6
902N	1	1	1	4367001700	Idler
950N	1	1	1	4367115200	Spring
953N	1	1	1	4367112060	Shaft
955N	1	1	1	4367115280	Spring
017F	1	1	1	51300308B0	P.H. TAP. Screw P3 x 8
018F	1	1	1	51280308B0	B.H. TAP. Screw B3 x 8
019F	2	2	2	51280310U0	B.H. TAP. Screw B3 x 10
020F	1	1	1	62031340W0	Lug
M001	1	1	1	MM10600370	D.C. Motor, D.C. Electrical

16.4 Head Chassis [P02-99]



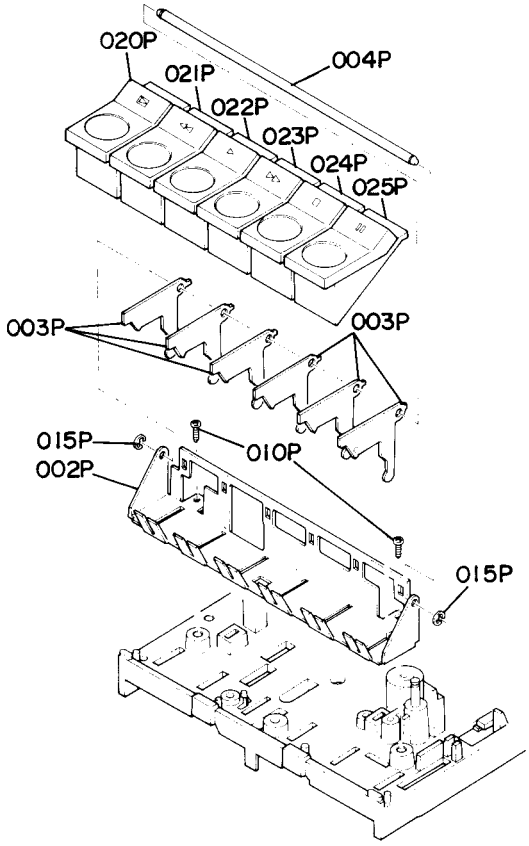
REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
150N	1	1	1	4367105022	Chassis
224N	1	1	1	4367115060	Spring
225N	1	1	1	4367115172	Spring
250N	1	1	1	4367115042	Spring
251N	1	1	1	4367115052	Spring
275N	1	1	1	51300308B0	P.H. TAP. Screw P3 x 8
280N	5	5	5	61020010T0	Ball
802N	1	1	1	4367160015	Bracket
803N	1	1	1	4367056010	Buffer
880N	1	1	1	62021030W0	Lug
883N	2	2	2	51100210A0	B.H.M. Screw B2 x 10
884N	2	2	2	51100210A0	B.H.M. Screw B2 x 10
H001	1	1	1	LH41222010	Rec./Play Head
H002	1	1	1	LH31000390	Erase Head

16.6 Parts Assembled on the Top of the Chassis [P03-99]



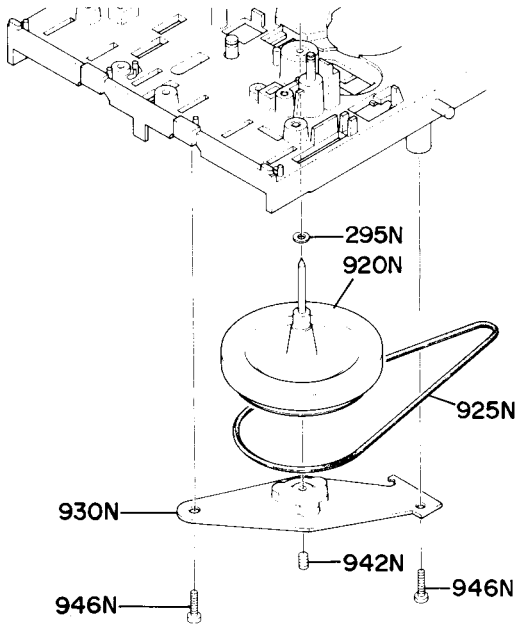
REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
002N	1	1	1	4367105700	Chassis
071N	1	1	1	4367354092	Lever, Brake
072N	1	1	1	4367354122	Lever
076N	1	1	1	4367002700	Arm, Pinch Rollers
110N	1	1	1	4367004703	Table,Take-up Reel
130N	1	1	1	4367004713	Table
140N	1	1	1	4367002710	Arm
185N	1	1	1	4367354770	Lever
195N	1	1	1	4367002053	Arm
196N	1	1	1	4367115130	Spring
201N	1	1	1	4367354083	Lever
202N	1	1	1	4367115070	Spring
235N	2	2	2	4367067010	Cap
236N	2	2	2	4367263010	Brake
245N	1	1	1	51380206P0	P.H. TAP. Screw P2 x 6
253N	1	1	1	4367115100	Spring
268N	1	1	1	4367115210	Spring
285N	1	1	1	64002500R0	RG Ring, E Type
286N	1	1	1	64001500R0	RG Ring, E Type
290N	2	2	2	59020402G9	Washer
300N	1	1	1	4367354110	Lever
502N	1	1	1	4367002092	Arm
503N	1	1	1	4367354150	Lever
504N	1	1	1	4367115210	Spring
845N	1	1	1	4367258010	Hook
846N	1	1	1	4378115020	Spring
060H	1	1	1	4168160022	Bracket
061H	1	1	1	4168052010	Counter
062H	1	1	1	4168264010	Belt
063H	2	2	2	51280308B0	B.H. TAP. Screw B3 x 8
064H	2	2	2	51100306A9	B.H.M. Screw B3 x 8
S001	1	1	1	SM01010640	Mini Switch, Motor and Amp.

16.5 Button for Tape Mechanism Operation [P04-99]



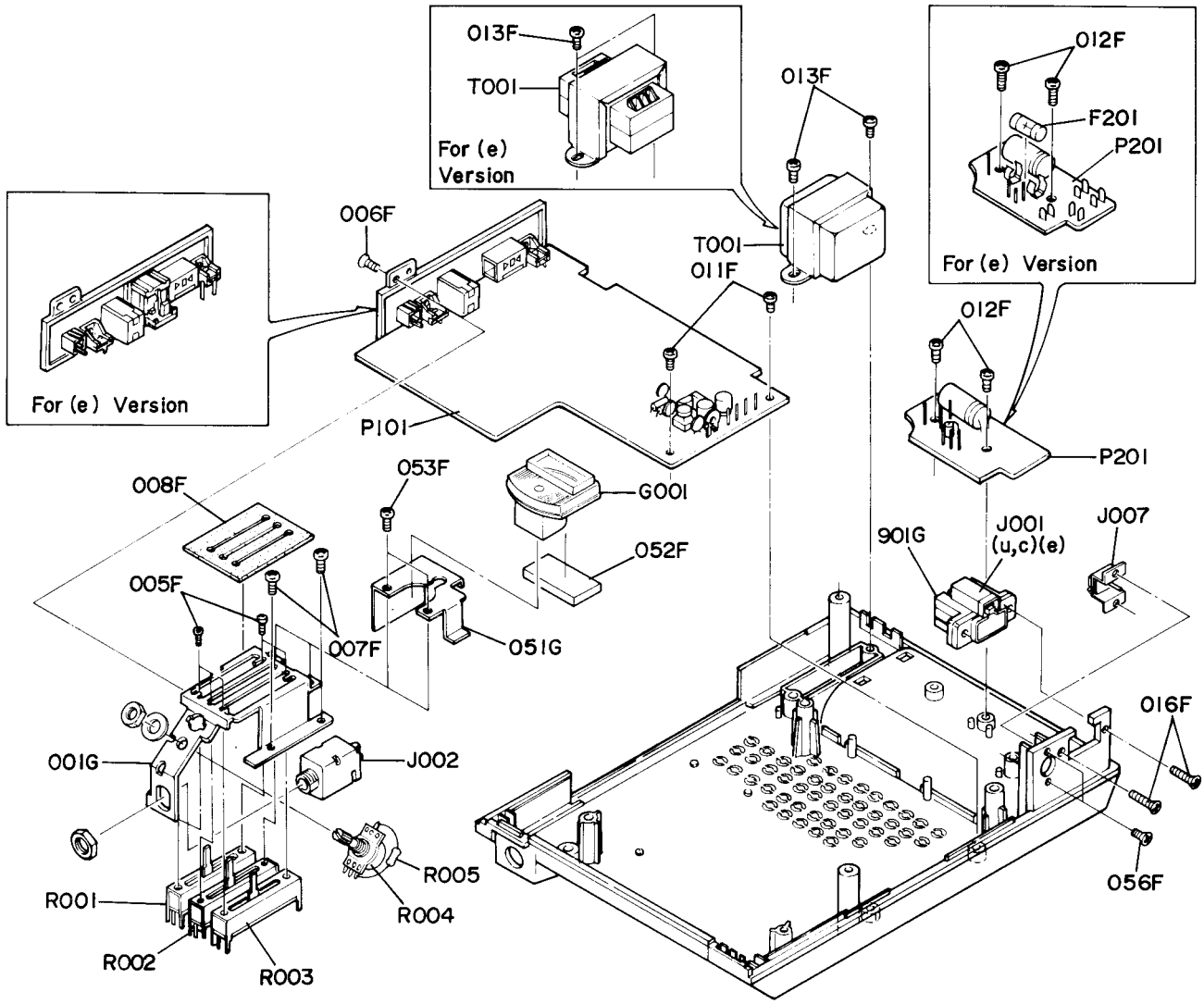
REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
E	1	1	1	4167270400	Button Assembly, Rec
003P	1	1	1	4378354010	Lever
020P	1	1	1	4167270010	Button
F	1	1	1	4167270410	Button Assembly, Rew
003P	1	1	1	4378354010	Lever
021P	1	1	1	4167270020	Button
G	1	1	1	4167270420	Button Assembly, Play
003P	1	1	1	4378354010	Lever
022P	1	1	1	4167270030	Button
H	1	1	1	4167270430	Button Assembly, FF
003P	1	1	1	4378354010	Lever
023P	1	1	1	4167270040	Button
I	1	1	1	4167270440	Button Assembly, Stop
003P	1	1	1	4378354010	Lever
024P	1	1	1	4167270050	Button
J	1	1	1	4167270450	Button Assembly, Pause
003P	1	1	1	4378354010	Lever
025P	1	1	1	4167270060	Button
002P	1	1	1	4378104010	Retainer
004P	1	1	1	4378112010	Shaft
010P	2	2	2	51300308B0	P.H. TAP. Screw R3 x 8
015P	2	2	2	64000400R0	RG Ring, E Type

16.7 Flywheel [P05-99]



REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
920N	1	1	1	4367273500	Flywheel
925N	1	1	1	4367264012	Belt
930N	1	1	1	4367104702	Retainer
942N	1	1	1	3483164020	Adjuster
946N	2	2	2	51300310B0	P.H. TAP. Screw P3 x 10
295N	1	1	1	59264702G9	Washer

16.8 P. W. Board and General Parts [M01-99]



REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
001G	1	1	1	4167160010	Bracket
005F	6	6	6	51100204S0	B.H.M. Screw B2 x 4
006F	1	1	1	51040306A9	F.H.M. Screw F3 x 6
007F	2	2	2	51280308B0	B.H. TAP. Screw B3 x 8
008F	1	1	1	4169107010	Sheet
011F	2	2	2	51280306B0	B.H. TAP. Screw B3 x 6
012F	2	2	2	51280308B0	B.H. TAP. Screw B3 x 8
013F	2	2	2	51280308B0	B.H. TAP. Screw B3 x 8
016F	2	2	2	51042612A0	F.H.M. Screw F2.6 x 12
051G	1	1	1	4168160012	Bracket
052F	1	1	1	3358118080	Spacer
053F	2	2	2	51100306A9	B.H.M. Screw B3 x 6
056F	2	2	2	51040206A0	F.H.M. Screw F2 x 6
901G	1	1	1	3370053010	Cover

REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
J001	1	1		YJ04000510	Jack, AC Jack
J001			1	YJ04000500	Jack, AC Jack
J002	1	1	1	YJ01001090	Jack, Headphone Jack
J007	1	1	1	YJ04000470	Jack, EXT DC Jack
T001	1	1		TS14121130	Power Transf.
T001			1	TS14124080	Power Transf.
R001	1	1	1	RX01030160	Variable Resist, Volume 10KΩ (A)
R002	1	1	1	RX01030160	Variable Resist, Tone 10KΩ (A)
R003	1	1	1	RX01030160	Variable Resist, Rec. 10KΩ (A)
R004	1	1	1	RK05020210	Variable Resist, Vari Speed 5KΩ (B)
R005	1	1	1	GD05362140	Resistor, 3.6KΩ ±5% 1/4W
G001	1	1	1	IM11034142	D.C. Meter, Rec/Batt.
P101	1	1	1	YK41671210	P.W. Board, Main
	1	1		ZZ41691210	P.W. Board Assembly
			1	ZZ41698210	P.W. Board Assembly
P201	1	1	1	YK41671220	P.W. Board, Power
	1	1		ZZ41671220	P.W. Board Assembly
			1	ZZ41678220	P.W. Board Assembly
F201			1	FS10063800	Fuse 630mAT

17. ELECTRICAL PARTS LIST

REF. DESIG.	Q'TY U	Q'TY C	Q'TY E	PART NO.	DESCRIPTION
					P101-AMP. CIRCUIT BOARD
P101	1	1	1	YK41671210	P.W. Board, Main
	1	1		ZZ41691210	P.W. Board Assembly
			1	ZZ41698210	P.W. Board Assembly
					P101-SEMICONDUCTORS
Q101	1	1	1	HT309002B0	Transistor, 2SC900 F or H
Q102	1	1	1	HT107332A0	Transistor, 2SA733 P or Q
Q103	1	1	1	HT309452B0	Transistor, 2SC945 P or Q
Q104	1	1	1	HT309452B0	Transistor, 2SC945 P or Q
Q105	1	1	1	HT404712B0	Transistor, 2SD471 L or K
Q106	1	1	1	HT404712B0	Transistor, 2SD471 L or K
Q107	1	1	1	HT309452B0	Transistor, 2SC945 P or Q
Q108	1	1	1	HD20004060	Diode, 1S1210
Q109	1	1	1	HD20004060	Diode, 1S1210
Q171	1	1	1	HD10003020	Diode, Meter
					P101-RESISTORS (**All resistors are ±5% and ¼W, unless otherwise indicated.**)
R101	1	1	1	GD05102140	1KΩ
R102	1	1	1	GD05104140	100KΩ
R103	1	1	1	GD05431140	430Ω
R104	1	1	1	GD05103140	10KΩ
R105	1	1	1	GD05222140	2.2KΩ
R106	1	1	1	GD05393140	39KΩ
R107	1	1	1	GD05224140	220KΩ
R108	1	1	1	GD05472140	4.7KΩ
R109	1	1	1	GD05562140	5.6KΩ
R110	1	1	1	GD05332140	3.3KΩ
R111	2	2	2	GD05103140	10KΩ
R112	1	1	1	GD05102140	1KΩ
R113	1	1	1	GD05222140	2.2KΩ
R114	1	1	1	GD05273140	27KΩ
R115	1	1	1	GD05123140	12KΩ
R116	1	1	1	GD05101140	100Ω
R117	1	1	1	GD05047140	4.7Ω
R118	1	1	1	GD05103140	10KΩ
R119	1	1	1	GD05152140	1.5KΩ
R120	1	1	1	GD05101140	100Ω
R121	1	1	1	GD05102140	1KΩ
R122	1	1	1	GD05331140	330Ω
R123	1	1	1	GD05221140	220Ω
R124	1	1	1	RC10022120	2.2Ω ±10% 0.5W
R125	1	1	1	GD05101140	100Ω
R126	1	1	1	GD05680140	68Ω
R127	1	1	1	GD05101140	101Ω
R128	1	1	1	GD05184140	180KΩ
R129	1	1	1	GD05223140	22KΩ
R130	1	1	1	RA05030240	50KΩ B Bias, Trimming
R131	1	1	1	GD05223140	22KΩ
R132	1	1	1	GD05102140	1KΩ
R133	1	1	1	GD05022140	2.2Ω
R134	1	1	1	GD05750140	75Ω
R135	1	1	1	GD05471140	470Ω
R136	1	1	1	GD05121140	120Ω
R137	1	1	1	GD05224140	220KΩ
R138			1	GD05473140	47KΩ
R139			1	GD05473140	47KΩ
R140			1	GD05392140	3.9KΩ
R171	1	1	1	RA02030130	Trimming Resist, Meter Adj.
R172	1	1	1	GD05223140	22KΩ
R173	1	1	1	GD05821140	820Ω
					P101-CAPACITORS
C101	1	1	1	EV10403560	Elect., 0.1μF 25V
C102	1	1	1	EA10505090	Elect., 1μF 50V
C103	1	1	1	EA10505090	Elect., 1μF 50V
C104	1	1	1	DD16201010	Ceramic, 200pF ±10% 50V
C105	1	1	1	DD16201010	Ceramic, 200pF ±10% 50V
C106	1	1	1	DD16500010	Ceramic, 50pF ±10% 50V
C107	1	1	1	EA33601090	Elect., 33μF 10V
C108	1	1	1	EA10701090	Elect., 100μF 10V
C109	1	1	1	DF16153010	Ceramic, 0.015μF ±10% 50V
C110	1	1	1	EA10601690	Elect., 10μF 16V
C111	1	1	1	EA47503590	Elect., 4.7μF 35V
C112	1	1	1	EA22701090	Elect., 220μF 10V
C113	1	1	1	EA47601690	Elect., 47μF 16V
C114	1	1	1	DK17102010	Ceramic, 1000pF ±20% 50V
C115	1	1	1	EA10801090	Elect., 1000μF 10V
C116	1	1	1	EA47701090	Elect., 470μF 10V
C117	1	1	1	EA22700690	Elect., 220μF 6V
C118	1	1	1	DK16103010	Ceramic, 0.01μF ±10% 50V
C119	1	1	1	DK17502010	Ceramic, 0.005μF ±20% 50V
C120	1	1	1	DD16501010	Ceramic, 500pF ±10% 50V
C121	1	1	1	DD16501010	Ceramic, 500pF ±5% 50V
C122	1	1	1	DF16102510	Film, 0.001μF ±10% 200V
C123	1	1	1	DK17302010	Ceramic, 3000pF ±20% 50V
C124	1	1	1	DK17102010	Ceramic, 1000pF ±20% 50V
C125	1	1	1	EZ10701010	Elect., 100μF 10V
C126	1	1	1	EA10701090	Elect., 100μF 10V
C127	1	1	1	DK17102010	Ceramic, 0.001μF ±20% 50V
C128	1	1	1	DD15301010	Ceramic, 300pF
C129	1	1	1	DK16102010	Ceramic, 1000pF
C130	1	1	1	DD16101010	Ceramic, 100pF
C131	1	1	1	DD16501010	Ceramic, 500pF
					P101-JACKS & PLUGS
J101	1	1		BY01040082	Jack, Jack Board
J101			1	BY01050102	Jack, Jack Board
J102	1	1	1	YP10001130	Plug, ECM
J103	1	1	1	YP10001130	Plug, ECM
J104	1	1	1	YP10001130	Plug, Volume
J105	1	1	1	YP10001130	Plug, Volume
J106	1	1	1	YP10001130	Plug, Volume
J107	1	1	1	YP10001130	Plug, Headphone
J108	1	1	1	YP10001130	Plug, Headphone
J109	1	1	1	YP10001130	Plug, Headphone
J110	1	1	1	YP10001130	Plug, Speaker

ELECTRICAL PARTS LIST

REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
J111	1	1	1	YP10001130	Plug, Speaker
J112	1	1	1	YP10001130	Plug, Speaker
J113	1	1	1	YP10001130	Plug, Motor
J114	1	1	1	YP10001130	Plug, Motor
J115	1	1	1	YP10001130	Plug, Switch
J116	1	1	1	YP10001130	Plug, Erase
J117	1	1	1	YP10001130	Plug, Erase Head
J118	1	1	1	YP10001130	Plug, Erase Head
J119	1	1	1	YP10001130	Plug, Rec-Play Head
J120	1	1	1	YP10001130	Plug, Rec-Play Head
J121	1	1	1	YP10001130	Plug, Rec-Play Head
J122	1	1	1	YP10001130	Plug, Head Earth
J123	1	1	1	YP10001130	Plug, Tone
J170	1	1	1	YP10001130	Plug, Meter
J171	1	1	1	YP10001130	Plug, Meter Earth
J172	1	1	1	YP10001130	Plug, Rec Level
J173	1	1	1	YP10001130	Plug, Vari Speed
J174	1	1	1	YP10001130	Plug, Vari Speed
J175	1	1	1	YP10001130	Plug, Vari Speed
					P101-COIL, SWITCH & TRANSFS
L101	1	1	1	LC13020010	Choke Coil 3μH Motor Filter
S101	1	1	1	SS08020150	Slide Switch Rec-Play
S171	1	1	1	SS02030090	Slide Switch
T101	1	1	1	TI11905060	Input Transf. Input Trans.
T102	1	1	1	TO12612010	Output Transf.
T103	1	1	1	TC10120020	OSC Transf.
					P-201 POWER SUPPLY CIRCUIT BOARD
P201	1	1	1	YK41671220	P.W.Board, Power
	1	1		ZZ41671220	P.C.Board Assembly
			1	ZZ41678220	P.C.Board Assembly
					P201-MISCELLANEOUS
Q201	1	1	1	HD20013100	Diode, Power 10D-1
Q202	1	1	1	HD20013100	Diode, Power 10D-1
Q203			1	HD20013100	Diode, Power 10D-1
Q204			1	HD20013100	Diode, Power 10D-1
C201	1	1	1	EA22801090	Elect, 2200μF 10V
F201			1	FS10063800	Fuse, SEMKO 630 mAT
J201			1	YJ08000200	Jack, Fuse Folder
J202			1	YJ08000200	Jack, Fuse Folder
J211	1	1	1	YP10001130	Plug, Lapping
J212	1	1	1	YP10001130	Plug, Lapping
J213	1	1	1	YP10001130	Plug, Lapping
J214	1	1	1	YP10001130	Plug, Lapping
J215	1	1		YP10001130	Plug, Lapping
J216	1	1		YP10001130	Plug, Lapping
J217			1	YP10001130	Plug
J218			1	YP10001530	Plug
J219			1	YP10001530	Plug
J220			1	YP10001530	Plug
J221			1	YP10001530	Plug
J222			1	YP10001530	Plug
J223			1	YP10001530	Plug
J224			1	YP10001530	Plug
J225			1	YP10001530	Plug

18. PARTS LIST (Packing)

REF. DESIG.	Q'TY U	C	E	PART NO.	DESCRIPTION
001T	1			4169851010	Instructions
001T		1	1	4169851310	Instructions
001U	1	1	1	4167809010	Cushion
002T		1		9650000050	S.Station Card
002U	1	1	1	4167809020	Cushion
003T		1		3917854012	Guarantee Card
004T		1		3917851020	Instructions
005T	4		4	9510911040	Label
005T		4		9510911050	Label
005U	1	1	1	4169801010	Packing Case
006T		2		9510901040	Label
006U	1	1	1	4169805010	Master Carton
007T	1			2876851030	Instructions
007T		1		3369851320	Instructions
008T	1			3906854024	Guarantee Card
008T		1		9630000152	Guarantee Card
008U	1	1	1	9012840010	Polyethy Bag
009T	1			9630000170	Guarantee Card
009U	2	2	2	9522815010	Serial No. Card
010T		1		2918813012	Envelope
010U	1	1	1	9011525010	Polyethy Bag
012T	4			2818811010	Polyethy Bag
012U	1	1	1	9011020010	Polyethy Bag
ZB01	4	4		ZB01020072	Battery
Z001	1	1	1	YP01000280	Plug
Z002	1	1		ZC02002030	A.C. Power Cord
Z002			1	ZC01805010	A.C. Power Cord

[W01-99]	Assembly and Wiring
[T01-99]	Adjustment
[X01-00]	Correction

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